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EDITORIAL NOTES

WOMEN IN THE GAS INDUSTRY

In a letter which we publish in the "JOURNAL" to-day, Mr. G. M. Gill says that in conversation with managers of several gas undertakings he has gained the impression that the view is held that the work which women are capable of performing in the Gas Industry, and particularly on gas-works themselves, is strictly limited. Remarking on this he points to the experience of the South Metropolitan Gas Company with female labour during the last War and expresses the hope that the Company might with advantage to the Industry recount this experience at the present juncture. Actually the range of work, heavy manual and otherwise, covered by women in the Industry in the last War was quite remarkably wide, and the amount and variety of female labour employed by the South Metropolitan Company provided a striking example, as the volumes of the "JOURNAL" covering the War period testify. The Company decided to give women a chance of shouldering all the responsibilities attached to the efficient operation of a retort house, and success attended this decision. In 1917, for instance, three retort houses at the Company's Vauxhall Works were "manned" and operated entirely by women, who carried out all the stage work from the opening and cleaning of the retort lids, augering the pipes, charging and discharging the retorts, and feeding hot coke to the producers. This went beyond the types of work suitable for women in gas-works suggested in a pamphlet issued by the Home Office and the Board of Trade in 1916 on the substitution of women in industry for enlisted men—which pamphlet, by the way, contained the statement that "it is the case that the managers of many gas-works have so far failed to realize how much of the work can be, and is being, done by women."

Regularly, in the extremes of heat of summer or in mid-winter frosts and fogs, the large retort houses at the South Metropolitan Gas Company's works were operated by women. Nor were they superficially of the Amazon type; some, in fact, were almost *petite*. There was one gang with not a woman in it over 5 ft. in height. Experience not unnaturally showed that the women were not individually capable of accomplishing as much work as the men; but they were paid on the principle of "equal work equal pay," which arrangement proved eminently satisfactory. Of course, retort house operation was one aspect only of the employment of female labour in gas-works. Other work of a heavy nature included the handling for revivifying of oxide from the boxes, the handling of coke and breeze, bricklaying, gasholder scraping and painting, and general labourers' work in the yards. And there were all manner of miscellaneous jobs on the works, such as engine cleaning, timekeeping, wagon driving, and so on; while "district" work included meter repairing, collection from prepayment meters, and, at that time, the maintenance of public lamps. By 1917 one-quarter of the South Metropolitan Gas Company's pre-War complement of employees had been substituted by women.

By January, 1917, the number of women employed by the Gas Light and Coke Company numbered about 1,100. In addition to normal clerical and ordinary office work they were engaged in work on the purification plant, cooker repairs, mantle manufacture and maintenance, and other work of the nature referred to in the previous paragraph. By the following January the total had grown to 1,600, slightly more than one-half being distributed between the gas-works and the clerical staff at Horseferry Road and other offices. Then in numerical order came the gas sales department, stove and meter works, and finally the products works. The Company reckoned that it took five women to fill the places of four men, but experience proved that the quality of the work was good.

At the first meeting of shareholders after the signing of the Armistice the late Dr. Charles Carpenter, in his speech as Chairman, remarked: "You heard during the War a great deal about indispensable labour. Apart from very necessary skilled superintendence and workers, our real indispensables have been the women. No job was too hard for them to tackle. As gas stokers they proved as good as men, though a lower standard per head—namely, two-thirds—has been taken as their basis of output and of their rate of pay. . . . Their spirit has been admirable, and the help they have given us invaluable." In view of this experience and that of other gas undertakings throughout the country in the last War the view cannot surely with justification be held that the work which women are capable of performing in gas-works and in other spheres of activity in the Industry is strictly limited.

STORAGE OF COAL

The policy of gas undertakings at the present time will be to stock as much suitable coal as they can obtain. This will entail extra handling costs for putting the coal into and taking it out of stock, but this will have to be faced. There is also the question of the effect of placing coal into stock and reclaiming it for use at a subsequent date—a question which has been freely discussed during recent months and on which considerable investigation has been carried out during recent years. The desirability has been pointed out of stocking definite types of coal. If such a practice can be followed, then it is likely that small difficulty will be encountered. It has been shown conclusively enough that storage of weakly-caking coals results in loss of caking power, reflected in the production of inferior and smaller coke on carbonization. Saleable coke is reduced and breeze accumulates. Where the coke is used for the manufacture of blue or carburetted water gas, output of plant is seriously lowered. Stocking of weakly-caking coals raises the cost of producing the gaseous therm.

In his Paper to the North British Association last April, Mr. Melvin suggested that influences may be brought to bear by which stocking of coal and withdrawal from stock may become part and parcel of carbonizing practice at any rate where weakly-caking coals are employed. We think this likely. This subject of stocking was dealt with in a Paper to the Yorkshire Junior Gas Association by Mr. J. C. Hogg, of Stretford, and we give an abstract from it in to-day's "JOURNAL." Until recently stocking accommodation was 14,000 tons. This is being increased to about 25,000 tons. Coal stocks are divided into four sections, one section being replaced every four years. Of late, conditions regarding coal supplies necessitated extensive use of stocks. Except for a slight increase in breeze production, neither with 2-year or 4-year-old stocks was change in carbonizing results detected. Consideration of the quantity of stock changed in relation to total coal carbonized and the cost involved is most interesting. Mr. Hogg works out that with an annual stock replacement of 6,250 tons the additional cost involved would amount to only 0.13% of coal costs. The satisfaction of knowing that an emergency can be met without upsetting the normal carbonizing schedule appears to us to be worth this additional expenditure.

GASHOLDER HEATING

Following upon the severe conditions of last winter, with the exceptionally low temperatures which prevailed over a prolonged period, the article by Mr. S. M. Milbourne which we published last February ("JOURNAL" of Feb. 28, p. 454) dealing with the maintenance of water-sealed holders in such circumstances proved of great interest in this country and in other countries. In that article the Author enumerated five methods of preventing ice forming in the tank inside the holder. The suggestions he put forward were subject to criticism in our correspondence columns, which added value to the article in

focussing attention on a problem unusual to gas engineers in Great Britain and in emphasizing the need for keeping anti-freezing equipment in proper working order at all times in any winter. Also through our correspondence columns Mr. Milbourne's communication led to discussion on the theoretical aspects of ice formation and the effect of the difference in conditions between a controlled experiment such as that of Hope's conducted in the laboratory many years ago, and concerned with the varying density of water through a range of temperature, and those obtaining in practice when an above-ground gasholder tank is subjected to piercingly cold winds and general low temperatures.

One correspondent suggested that in connexion with the subject it might be helpful to learn of the experiences of gas engineers in Canada, in which country winters are always more severe and more prolonged than they are here. In this regard Mr. George W. Allen, Secretary-Treasurer of the Canadian Gas Association, has sent us a copy of a Paper Mr. C. W. Delorey gave some time ago to the Canadian Gas Association. We reproduce it in to-day's "JOURNAL." It dealt with holder heating at Quebec, where heating is necessary for five months each year, and the data and experience refer to a water-sealed holder with steel tank completely above ground. Arrangements are such that the temperature of the holder water averages 48° F., at which temperature there is no chance of anchor ice formation and there is sufficient heat stored in the water to prevent freezing in the event of a short interruption in the steam supply to the holder. The connexion of the steam syphons, of which four sets are used, can be seen from one of the diagrams we reproduce, and, in view of the criticisms of Mr. Milbourne's article, it will be particularly noted that one syphon delivers its heated water at a depth of 5 ft. 6 in., while the water from the other syphon is discharged at a point 3 ft. from the bottom of the tank. In each case the water is released in a horizontal direction in order to create circulation of the water in the tank. The average outside temperature at Quebec during the heating season is about 16°-19° F. and often average weekly temperatures are zero or below. But nothing is left to chance, and costs are reduced to a minimum by systematic and careful control of the temperature of the holder water, a recording thermometer being used to follow the temperature of the water. A graph (Fig. 3) of the Paper indicates how satisfactorily the system works, and with what uniformity the temperature of the tank water is maintained, irrespective of fluctuations in outside temperature throughout the heating season.

TEMPERATURE AND OUTPUT

At a time when in this country the publication of weather forecasts and meteorological observations is for obvious reasons not allowed, it is interesting to note to what extent temperature readings are entering into the daily routine of gas undertakings in the United States of America. For a long time now American gas engineers have taken a keen interest in the question of the effect, or likely effect, of temperature fluctuations on gas output and have for years found the "degree-day" a very useful unit of reference. This term was standardized by the American Gas Association as a unit which is the difference between 65° F. and the daily mean temperature when the latter is below 65° F. In Great Britain, where an inside temperature of 65° F. is generally preferred to one of 70° F., the adoption of a temperature of 60° F. as a base for the British degree-day would appear suitable. Its adoption would be useful not only in estimating for heat requirements but also in comparing the results of different undertakings. For example, it has been shown that there is a variation of from 3,000 to 6,500 degree-days in different parts of the country. Altitude, of course, has its effect, but it has been found by many undertakings that one degree rise or fall in temperature causes approximately 1% decrease or increase in the amount of gas sold.

Attention to the thermometer should be part of every gas distribution man's daily work. The latest news we have from America is of the practice of the Lone Star Gas Company. A radio receiving set was, we learn, installed in January of this year which brings in hourly weather reports on 19 towns within a radius of 250 miles of Dallas and aids in co-ordinating operation of pipelines, compressor stations, and district governors. It has been found particularly useful at times of falling temperatures. The reports are recorded on special forms, the radio being turned on at the recorder's office automatically each hour. For night use, a loud speaker has been installed in the telephone switchboard room. The system, it is stated, works smoothly and eliminates a large number of telephone calls to points on the district. During last winter's abnormally severe weather the reports on temperature and wind velocity, together with knowledge of customer demand, resulted in a service of a standard which otherwise would have been impossible—a service which, in spite of breakage of mains, was uninterrupted to 300,000 homes during the winter's most severe onslaught.

Personal

On retiring from the position of Gas Engineer and Manager at Burntisland, Fife—a post he has held for 24 years—Mr. WILLIAM BROWN has been presented with a drawing-room double-chime clock from the Provost, Magistrates, Town Council, and Burgh officials. The gathering was presided over by Provost Leith, J.P., and the gift was handed over by Bailie Kinninmonth.

* * *

Alderman R. KIRK, Chairman of the Rotherham Corporation Gas Department, desires to thank his many friends in the Gas Industry for the numerous letters of condolence and expressions of sympathy in his recent bereavement in the loss of his wife.

* * *

Mr. W. L. PRICE, who for some two years has been Sales Manager to the Boston Gas Light and Coke Company, left Boston on May 16 for the North of England, where he has taken up a post in an aircraft factory.

Obituary

The death has occurred of Councillor JOSEPH HENRY ARMORY, J.P., Chairman of the Bishop Auckland Gas Company and a Director of the Durham Gas Company. Councillor Armory died in Darlington Hospital following an operation for appendicitis.

Annual Meeting of the S.B.G.I.

In view of the recent developments in the international situation and the consequent decision of The Institution of Gas Engineers to postpone its Annual General Meeting, the Society of British Gas Industries has also decided to postpone its Annual General Meeting, which was to have been held at the Bessborough Room, Grosvenor Hotel, S.W. 1, on Wednesday, June 5.

Forthcoming Engagements

May

30.—B.C.G.A.—Meeting of Members in South Wales District, Gas Offices, Cardiff, 2.45 p.m.

June.

1.—London and Southern Juniors.—Visit to Tottenham Gas-Works.

5.—N.G.C.—Annual General Meeting, May Fair Hotel, Berkeley Street, W.1, 2.30 p.m.

5.—Federation of Gas Employers.—Annual General Meeting, May Fair Hotel, 3.15 p.m.

5.—N.G.C.—Annual General Meeting, May Fair Hotel, Berkeley Street, W.1, 2.30 p.m., followed by Special General Meeting.

11.—B.C.G.A.—Meeting of Members in Manchester District, Demonstration Hall, Town Hall Extension, Manchester, 2.30 p.m.

15.—Western Juniors.—Meeting at Taunton. Paper by K. G. Eccleshare.

18.—B.C.G.A.—Meeting of Executive Committee, 10 a.m.

18.—I.G.E.—Gas Education Executive Committee, 2 p.m.

28.—Waverley Association.—General Meeting, North British Station Hotel, Edinburgh.

[*There will be no meeting of the Central Executive Board of the National Gas Council during the month of June.*]

August.

13.—Irish Association.—Annual General Meeting at Dublin.

The Ministry of Labour and National Service announces that professional engineers who are enrolled on the Central Register and who are immediately available for national work in their professional capacity are requested to send a postcard to that effect with their name, address, and telephone number to the Central Register, Ministry of Labour, Tothill Street, Westminster, S.W. 1.

Letter to the Editor

Female Labour in the Gas Industry

SIR,—I was speaking to a number of Managers of Gas Companies a few days ago on the question of replacing men who have joined up by women. In the course of our discussion I found that the prevailing impression was that there were only a few jobs that could be done by women, and that it was, therefore, hardly worth while to adopt women labour on so small a scale.

Remembering as I do the really wonderful work which was done during the last war by the South Metropolitan Gas Company in the adoption of female labour for every kind of work, however hard, I could not accept any such idea of the possibilities in this direction.

I well remember the complete operation of large horizontal retort houses by women, with no men to help in any of the work. This necessitated the substitution of lighter tools, notably clinkering tools and augers, but this was rendered quite practicable by the use of high-grade steel for such tools. These were later adopted as a standard for men after the war.

The object of this letter is not to explain what was done by the South Metropolitan in this direction, but to ask whether the Company could add to its many notable contributions to the welfare of our Industry by publishing an account of the work done by women during the last war. It was such fine work in the National interests that it would be a thousand pities not to tell the Gas Industry what was done then and what could be done again.

In conclusion I feel that I must give credit to the late Dr. Carpenter, who was the driving force behind that great achievement.

Yours, &c.,

Gas-Works, Cheltenham. G. M. GILL.
May 22, 1940.

NEWS OF THE WEEK

The Calorific Value of the gas supplied by the Ennerdale Gas Undertaking will, on and from Sept. 1, 1940, be 500 B.Th.U. (gross) per cu.ft. for the complete limits of supply instead of the quality of 425 B.Th.U. hitherto supplied within the Cleator Moor and Egremont limits.

In Co-operation with Gas Undertakings throughout Great Britain, the cookery demonstrators of R. & A. Main, Ltd., have, since the middle of November last, given upwards of 250 lectures to gas consumers on the subject of economy in food and fuel through the use of modern gas appliances.

The First Gas-Driven Vehicle at Gainsborough made its appearance recently. The local authority have decided to provide the necessary plant at their works, and the Gas Engineer and Manager (Mr. J. A. Derbyshire) estimates that it will be possible to provide gas at a cost equal to petrol at 1s. a gallon.

Copies of the Following British Standard Specification (A.R.P. Series) can be obtained on application to the Secretary of The Institution of Gas Engineers, 1, Grosvenor Place, S.W. 1, price 10d. each, post free. BS/ARP/32: Illuminated and Non-Illuminated A.R.P. Signs, May, 1940—superseding BS/ARP/32, November, 1939.

Experiments with Gas-Driven Buses are being undertaken at Glasgow. A single-decker vehicle is to be fitted with a gas bag at an estimated cost of £87, while a double-decker bus will be converted for operation on compressed gas, this involving an expenditure of almost £1,000. The Transport Manager has been authorized to co-operate with the Gas Department in initiating the experiment. Both Departments will share equally in the expenditure involved.

By a Majority of 78 Votes to 10 Glasgow Corporation on May 23 decided to accept the offer of William Dixon, Ltd., to supply the city with not less than 28 million cu.ft. of coke oven gas weekly. Urging acceptance of the offer, Mr. Thomas Wilson, Convener of the Gas Committee, said if the Corporation did not carry the proposal, he would not accept responsibility for the supply of gas in the Glasgow area next winter.

The National Food Campaign is being well supported by the Newport (Mon.) Gas Company. The inaugural meeting—the first of its kind in South Wales—was addressed by Sir Thomas G. Jones, K.B.E., the Divisional Food Controller, who was followed by Mr. R. S. Snelling, General Manager and Secretary of the Gas Company. The latter declared that if the 20,000 housewives of Newport co-operated success was assured to the Campaign. The Newport Gas Company, he said, would co-operate completely in the Campaign.

Notice is Given of the intention of the Llantrisant & District Gas Company to apply to the Board of Trade for an Order under Section 1 of the Gas Undertakings Act, 1929, to authorize the Company to borrow on mortgage of their undertaking or to raise by the creation and issue of debenture stock any sum or sums not exceeding in the whole 75% of the aggregate amount of the paid-up share capital of the Company, and of any premiums paid in respect thereof. The Order also seeks to modify the provisions of the Gas Company's own Act of 1913.

A Successful Series of demonstrations was held by the Southampton Gaslight and Coke Company from May 6 to 10. Great interest was shown in the economical menus—prepared with the aid of "Streamline Newhome" cookers. The demonstrations were given by Miss E. D. Newberry (Stoves, Ltd.).

Employees of the Cambridge University and Town Gas Light Company who are members of the Local Volunteer Defence Corps have been on duty at the Gas-Works since the night of May 22. The Appeal for volunteers, made by the General Manager (Mr. J. Hunter Rioch) met with an excellent response, and the Gas Company's section is now 50 strong, and is sufficient to provide armed guards throughout the night, each guard doing duty one night in four. The Company's section will be in charge of its own Section Leader, Mr. A. Chapman, under the Cambridge Group Commander.

Assistance with Technical Problems

The Council of the International Tin Research & Development Council emphasises that it has accumulated much experience, particularly since the war began, on a wide range of processes in which tin is directly or indirectly concerned, and that this experience is available without charge. These processes include grease-tinning and hot-tinning, soldering, bearings and bearing materials, bronze, electro-tinning, fusible alloys, particularly for rapid die and punch mounting, tube bending, &c.

Advice can sometimes be given by correspondence, but as in many cases personal contact is much more effective, the Council is prepared to send members of its staff to give assistance and advice at individual works.

Scottish Junior Gas Association

(Eastern District)

The Annual General Meeting of the Scottish Junior Gas Association (Eastern District) was held in the Council Chambers, Dunfermline, on May 11. The President, Mr. C. D. BLACKHALL (Edinburgh), presided.

The various reports were adopted as also was the balance-sheet; and in this connexion it was agreed that two classes of membership be instituted—senior and junior, the junior members up to 21 years to continue paying an annual subscription of 5s. and the senior members to pay 7s.

The following Office-bearers were elected for Session 1940-41:

President.—W. Nicol Baird, Dunfermline.

Vice-President.—S. G. Melville, Edinburgh.

Hon. Secretary and Treasurer.—T. B. Livingstone, Hamilton.

Hon. Assistant Secretary.—J. F. Wilson, Perth.

Librarian and Education Representative.—A. J. Doran, Edinburgh.

Hon. Auditors.—E. L. Farquhar (Kennoway) and M. Darling (Broxburn).

Council.—C. D. Blackhall, Edinburgh, *ex-officio*; T. R. Sawers, Perth; A. A. Mitchell, Penicuik (one year); T. P. Napier, Kirkcaldy; Wm. Carson, Edinburgh; A. W. Brown, Alloa.

Mr. Robert Cowie announced that the Council had decided to invite Mr. A. C. Rea, Engineer and Manager, Perth Corporation Gas Department, to become an Honorary Member of the Association. Mr. Cowie said that a great deal of the present strong position of the Association was due in no small measure to the efforts of Mr. Rea.

The President announced that the Council had reluctantly been compelled to abandon the Annual Outing for the Session, owing to prevailing conditions.

Strategy on the Home Front

The active support being given by the City of Leicester Gas Department to the National Food Education Campaign was demonstrated recently by a specially arranged meeting of the Leicester Women's Gas Circle.

Miss G. Haigh, Principal of the Leicester Domestic Science College, presided, and a novel and interesting feature of the meeting was a discussion between two housewives, whose problems were answered by Miss M. G. Witham, of the Leicester Domestic Science College. Assisting her was Mrs. Eileen Murphy, of the B.C.G.A. and liaison officer between the Association and the Ministry of Food. Mrs. Murphy emphasized the great contribution to victory that could be made by spending wisely, using home-produced food, and avoiding waste. The important part that could be played in the present war on the kitchen front was stressed by Mr. James Mitchell (Engineer and Manager of the Leicester Gas Department).

Miss Haigh gave particulars of the opportunities afforded to housewives by free demonstrations in different districts in the city, while other speakers included Mr. P. J. Lupton (District Officer for the Ministry of Food) and Miss H. Forrester (Organizer of the Leicester Women's Gas Circle).

It may be observed that the Local Press gave considerable prominence to this meeting, and the Leicester Women's Gas Circle are to be congratulated on the success which attended the gathering.

WALES ASSOCIATION AT PORTHCAWL

The Industry in Peace and War

As was to be expected, attendance suffered somewhat at the thirty-fifth Annual Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers on Thursday, May 23, but a goodly number of members faced the President, Mr. J. PROSSER JONES, when he opened the proceedings in the Grand Pavilion at Porthcawl.

There was an official welcome by Councillor Dr. Chalke, Chairman of the Porthcawl Urban District Council, who voiced the town's pride in its gas undertaking, and appreciation of the services of the Gas Engineer, Mr. D. E. West.

Reference was made by the President to the severe loss that the Association had sustained through the death of Mr. Wilfred Jones, and those present marked their sympathy and respect in the customary manner. Similarly, sympathy was expressed with Mr. W. H. Johns, of Swansea, who was absent in consequence of a family bereavement.

Membership

The following additions were made to the membership roll of the Association:

Members.—T. Jones, Manager, Mountain Ash Gas Company.
D. J. Heycock, Senior Technical Assistant, Port Talbot Corporation Gas Department.
Associate Members.—J. A. Bedford, Chairman, Cardigan and Fishguard Gas Company, Ltd.
A. F. Oatley, Sales Manager, Cannon Iron Foundries.
H. W. Abbott, South Wales Tar Distillers.
Student.—K. G. Brown, Llanelly.

It was explained that, consequent upon the death of Mr. Octavius Thomas, and afterwards of Mr. Wilfred Jones, the financial affairs of the Association had got somewhat out of gear, and it was therefore proposed to postpone the presentation of the accounts until the September meeting.

New Office-Bearers

The following were elected office-bearers for the ensuing year, to take up office from the September meeting.

President.—R. L. Aspinall.
Junior Vice-President.—A. E. Pask.
Members of Council.—W. T. Kenshole, H. D. Madden, and H. Maycock.
Hon. Secretary.—E. M. Edwards.
Auditors.—S. Walker and F. Boardman.

The Senior Vice-President remaining in office is Mr. J. F. Rust.

In proposing the election as President of Mr. R. L. Aspinall, of Barry, Mr. H. D. Madden said he had known him ever since he joined the Association. He was a neighbour in an area which joined that of the Cardiff Gas Company, and he had greatly appreciated his assistance and co-operation since he had been at Barry.

It was agreed that a grant of ten guineas be made to the Benevolent Fund of the Institution of Gas Engineers, and thereafter Mr. J. H. Canning, as Hon. Treasurer, reported upon the Octavius Thomas Memorial Fund. He said that the total amount subscribed was £294 18s. 6d., and with this had been purchased a nominal value of £407 9s. of 2½% Consols, at 72⅛. From this the annual income would be about £10 4s., and it was now in the discretion of the Council to allocate the income to suitable objects.

Next Mr. K. E. Muir, who was present in uniform, was presented by Mr. Canning with the silver medal of the Society of British Gas Industries for his Paper before the Wales and Monmouthshire Junior Gas Association, entitled "Testing Modern Gas Appliances."

Presidential Address

Mr. PROSSER JONES then delivered his Presidential Address (which will be found on other pages of this week's "JOURNAL").

Among the apologies for absence was one from Mr. George Dixon, the President of the Institution of Gas Engineers. Mr. Madden remarked that Mr. Dixon would be very disappointed at the enforced postponement of the meeting of the Institution, and on his proposition it was resolved to send Mr. Dixon the following telegram: "Wales and Monmouthshire Association now in session send you hearty greetings, best wishes, and assurance of our loyal support.—Prosser Jones, President."

The Industry in Peace and War

The remainder of the business consisted of the consideration of a Paper by Mr. Madden, of which he gave a *précis*, and which has already appeared in the "JOURNAL" (p. 399), entitled "The Gas Industry in Peacetime and War."

Discussion

Mr. **J. H. Canning** (Newport) remarked that the Paper gave them an admirable picture of what took place during the last war and what was taking place now. When the last war began, the Gas Industry consisted of 1,400 or 1,500 isolated units, and this led to most of the difficulties that had been emphasized in the Paper. In dealing with the Government in the matter of the production of toluole and other materials, there was then no organization which could speak for the Industry as a whole, and in all its aspects. An immense debt of gratitude was owed to those who, at the termination of the war, were foresighted enough, and sufficiently energetic, to consolidate the position of the Industry by the establishment of the National Gas Council and the Federation of Gas Employers. They should continue on these lines, and endeavour to attain even greater unity than existed to-day. He hoped that the activities of industries which were trying to help the country would not be too much fettered by red tape.

Mr. **W. T. Kenshole** (Merthyr) said that, whatever difficulties they might have to face in the future, they could go forward confidently, bearing in mind the wonderful service which was being given to them by the manufacturers of gas appliances. There was now available for their consumers the most adaptable and useful apparatus. This was a debt which they owed to the manufacturers, and it was up to them to make the fullest use they possibly could of these appliances. If they had proved that the Gas Industry was essential as a fuel industry, what was preventing the more rapid extension of it? The answer was, price. Research, and the useful application of its results, was going to be of immense assistance to them in helping to stabilize the price of their main commodity, and thus make it available in further fields.

Mr. **R. L. Aspinall** (Barry) pointed out that one of the many problems that would have to be faced in the years that lay ahead was, as mentioned by the author, the alteration in allocation of population. There was a great tendency to growth of industry in South Wales.

Mr. **W. M. Fox** (London) expressed the opinion that it should be practically compulsory to extract benzole and toluole. The Industry had done very well in this matter, but he considered that, at a time like the present, economics should go by the board, and extraction should be undertaken regardless of cost. As to maintenance of plant in difficult circumstances, the author might have mentioned various other ways of assisting maintenance and at the same time conserving the country's resources. Concreting of steel columns, &c., was an example. They were passing through very difficult times at present, and the contracting side was an integral part of the Gas Industry which must be kept going.

Mr. **W. Clark Jackson** (Neath) said that Mr. Madden had for many years been a staunch guide and friend to members of the Association. The prestige of the Industry did rise during the last war, and there was little doubt that, if they all pulled their weight, this prestige would take another great step forward during the present war. Demonstrations suited to the times were greatly appreciated by the working housewife, who liked to hear about "war dishes." With regard to the contractors, to whom Mr. Fox had referred, it was no more than fair that they should keep them in mind at times like the present. If they were put out of commission because there was no work for them to do, it would be a bad thing for the Industry. Considerations of cost ought not to prevent undertakings from giving the contractors the opportunity of keeping their plant in condition, so that after the war the works would be in a position to carry on efficiently.

Mr. **Madden** briefly replied to the points that had been raised in the discussion; and he was accorded a hearty vote of thanks for his Paper, on the proposition of the President, seconded by Mr. J. F. Rust (Newport).

Social

The meeting was followed by luncheon in the Esplanade Hotel, when Mr. Madden proposed "The Town and Trade of Porthcawl," which was responded to by Dr. Chalke. Mr. G. Jenkins, Clerk to the Council, submitted "The Association," which was acknowledged by the President.

On the previous day the Golf Circle held their usual competition (organized with his accustomed efficiency by Mr. Joe Sadler) on the Radyr Golf Links, near Cardiff, and in the evening members and friends dined together at the Park Hotel.

In the morning competition for the Upjohn Cup the scores were as follows:

J. Powdrill	...	...	87 − 18 = 69
T. B. Walker	...	...	87 − 16 = 71
E. S. Allen	...	...	89 − 17 = 72
D. Rees	...	...	79 − 5 = 74
W. M. Fox	...	...	88 − 12 = 76
W. R. Branson	...	...	96 − 18 = 78

Foursomes arranged for the afternoon had to be cancelled, consequent upon unfavourable weather conditions.

BENZOLE . . .

THE country needs more benzole for chemical purposes and for motor spirit. Apart from the additional quantity which can be obtained from carbonising plants not now stripping, there are many directions in which all might look to ensure maximum production.

Among these may be mentioned the following :—

1. The employment of *total* stripping on those plants now practising only partial recovery.
2. The maintenance of wash oil in good absorptive condition as regards distillation range, viscosity and freedom from deposits.
3. The circulation of adequate quantities of wash oil at all times and especially with a view to compensating for varying atmospheric conditions.
4. The close control of the temperatures of the contacting gas and wash oil.
5. The effective stripping of the absorbing oil to maintain a uniformly high level of recovery from the gas.
6. The provision of adequate supplies of cold water for condensing and cooling purposes.
7. The full use of all modern developments leading to the enhancement of the yield of motor fuel, e.g., the efficient removal of organic sulphur and by this means the avoidance of heavy chemical washing, conserving unsaturated hydrocarbons in which gum formation can be inhibited.
8. The acceptance by the distributors of all benzole homologues which, in the relative absence of toluene, can be usefully incorporated in motor fuel.
9. The use of efficient and flexible fractionating equipment with completely controllable reflux system to provide the maximum yields of pure products at each distillation, thus eliminating the unnecessary recycling of intermediates with attendant distillation losses.

W-D BECKER OVEN PLANTS in this Country are producing annually upwards of 24,000,000 GALLONS OF CRUDE BENZOLE expressed as 65% at 120°C.

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THE WALES AND MONMOUTHSHIRE ASSOCIATION

Presidential Address

of

J. PROSSER JONES

Annual Meeting at Porthcawl, May 23

You very generously elected me as your President for the ensuing year, but I have no home to which I can invite you. It is nearly five years since I retired from the position of General Manager and Secretary of the Rhymney and Aber Gas Company, on the occasion of the acquisition of the Undertaking by the United Kingdom Gas Corporation, and although the Corporation honoured me with a seat on the Board of the Company, and on some of the other Undertakings acquired by them, I am not in that close touch with the management, and all that it implies, as heretofore. To make matters worse, my predecessor, Mr. A. W. Branson, and my former colleague, Mr. Barton Grainger, have told you on former occasions all there is to know about the works and plant of the Company—so I am left high and dry.

Thinking of what I could say to you, I looked back mentally over the long vista of years, and it occurred to me that it might interest you if I put together a few fragmentary notes on the development of the Company from its administrative side notwithstanding the financial and other difficulties which hampered it in its earlier years, and finishing with a few general observations.

The object of the Company was to take over several small gas and water undertakings which were dotted over the Rhymney and the Aber Valleys, and to build new gas-works and reservoirs.

Early Days

The Company was born in travail. The first attempt to produce it in 1897 resulted in a miscarriage. The Bill was opposed by all the Authorities in the area (six District Councils and two County Councils) and was thrown out; but its parents were determined and persistent, and the Company was created in the following year. By this time trouble was brewing in South Africa, which resulted in war in 1899. When the Prospectus was issued in that year the capital subscribed was nothing like the amount offered to the public for subscription, and this fact alone hampered the Company for many years.

I have not any particulars of the gas made, but a reference to the 1899 accounts shows a gross revenue from gas and residuals of £2,199 and from water rates £1,782.

The administrative staff at that time consisted of the Manager, Mr. A. R. Cawley (well-known to some of the older members of the Association), who was at the time of his appointment to the Rhymney Company Manager of the Llanelly Gas Company, and myself. Mr. Cawley continued for some time at Llanelly, paying weekly visits to the Rhymney and Aber Company.

My job was of a somewhat varied character. I was assistant to the Manager, visiting the works in his absence, keeping an eye on the distribution staff, storekeeper, collector, and perfoming the clerical work—good experience for a budding Manager. What I did in my spare time I have forgotten. We had no office in the district, but used a room in Cardiff. This went on for some time, and then we blossomed out. The Manager came to reside in the district, and an office was opened at Caerphilly. We promptly increased our staff 100% by the addition of a clerk and a junior. We then settled down in earnest.

The advent of the Powell Duffryn Colliery Company into the Rhymney Valley meant that the valley developed rapidly, and we found the greatest difficulty through lack of capital in keeping pace with it. We built a reservoir and gave the contractors 5% bonds in payment for it. Instead of building a new gas-works, as was intended, we patched and patched the existing ones, which was a costly method, and eventually as the development continued they became inadequate.

Coke Oven Gas

Something had to be done; so in 1907 we investigated the possibility of using coke oven gas from the Powell Duffryn Collieries, and started to use it in 1908.

There is now no harm in admitting that the early years were fraught with difficulties and anxieties. One distinguished member of our Association once referred to coke oven gas as "that miserable stuff." I do not think that even he knew how near he was to the truth. One of the greatest difficulties that confronted us in those distant days was to educate the Colliery Officials. Their attitude seemed to be "Gas is gas and if it is good enough for us to burn under the ovens it is good enough for you." Difficulties, however, are created to be overcome, and by dint of pertinacity it was not long before we got matters going smoothly, and they have continued so ever since. Coke oven gas has since come into its own, and instead of ploughing a lonely furrow, as we did in those far-off days, we are now one in a crowd, there being a round half-dozen in this district alone using it.

There is no gainsaying that there are many advantages in the use of coke oven gas which are obvious and hardly worth my wasting your time in recounting. To mention one or two, however, there is the conservation of our coal resources, which leads me to think of the difficulties you are experiencing at the present time in getting supplies, and to express the hope that matters will quickly improve. One has only to study the expressions on the faces of the members at our meetings when the coal question is discussed—one can tell at a glance the users of coke oven gas by their smug complacency, and the coal users by their fierce expressions of anger and hate of everybody in general, and colliery proprietors, railway managers, and Government officials in particular. Then there is the question of labour and also the financial aspect—both important problems in these days.

Reverting to the Company, after ten years of hard toiling the Company turned the corner, and the shareholders for the first time received a dividend of 2%, not a very fat one, but it was a start.

The Company passed through the war period of 1914-1918, a period which provided unprecedented difficulties and anxious moments for the harassed Gas Managers, until 1921. In that year the water undertaking was sold to the local authorities in the area. Operating from that year as a gas undertaking alone the Company went from strength to strength until it reached its peak year in 1925, when the output was round about the 300 million cu.ft. mark and the revenue £48,500.

In 1926 the Company, in common with other undertakings, received a setback through the disastrous coal strike which occurred. In that year the Directors introduced a co-partnership scheme which has worked well, and the employees of the Company now hold a substantial amount of ordinary stock. I know there is nothing new in a scheme such as this, but I mention it because it has brought the employees and the Directors into close touch in a rather unique manner. The employees conceived the idea of having a dinner and of inviting the Directors to be present as their guests. On soliciting my opinion I told them I thought it a nice gesture and I felt sure the Directors would appreciate the thought. The Directors promptly accepted the invitation and enjoyed themselves so much that they invited the employees to be their guests the following year. This dinner has now become an annual event with the employees and the Directors acting as hosts alternately. The Directors look forward to this function, and it would have to be something of importance that would keep them away.

Progress

Looking back over a long period one can think of many things that might have been done and some things left undone. One observes many changes in the Industry—changes in the attitude of consumers towards gas—changes in the attitude of the undertakers to their consumers—both to their mutual benefit. It was realized that the goodwill of the consumer was vital to success. The old days of "take it or leave it" have passed. The Industry realized that it could not afford to sit down and wait for consumers to come along. Competition and the last war put the finishing touch to that idea. Improvements were made in apparatus. Showrooms made their appearance, even with small undertakings. Advertising appeared. The British Commercial

Equipment . . .

LARGE SCALE EQUIPMENT FOR STAFF CANTEENS, ETC.

FROM areas served by Gas comes much of the considerable and—under present conditions—rapidly expanding need for kitchen and canteen equipment of all kinds.

The Radiation facilities for carrying out this class of work are widely known through the Trades Press, and enquiries for the introductory booklet already indicate the scope of this field.

Radiation have carried out a major proportion of this emergency equipment work for which they are able to cater completely, whatever size of installation may be in question.

Assistance from the trained Radiation staff is readily available in planning layouts and solving any particular problems that may arise.

The Radiation Large Scale Equipment catalogue is obtainable on request.

Radiation

Gas Association was formed to do what it was impossible for single undertakings to achieve. Demonstrations of the uses to which gas could be put began to be held. Methods of maintenance of consumers' appliances were introduced. Efforts were directed to educate the people as to the value of, and the best way of using, gas—efforts which I believe have been appreciated by consumers. Even in mining districts where coal is cheap the habit of cooking by gas is growing.

Excursions into the industrial field are being energetically pursued, which is all to the good, but we must not neglect or overlook our domestic load. Personally, I like to see the increases in the number of domestic consumers with their consequent increase in consumption. It is more stable, for, after all, gas for industrial purposes is largely dependent on trade conditions, and, of course, the price is also an important factor. It is strange how values have altered. There was a time when enquiries for a million cu.ft. per annum caused a flutter of excitement, but now Gas Managers talk quite nonchalantly of enquiries for 50 or 100 millions per annum. I believe there has been an enquiry for a supply of over 1,000 millions. Please do not misunderstand me; I am all for developing gas for industrial purposes.

So far from being a decadent industry as some would have us believe the Gas Industry is indeed a vigorous one. In addition to supplying light, heat, and power, it plays a large part in the national life of the country—

> In growing foodstuffs it is a useful contributor. In the medical world its products are being utilized. In the field of war it is essential—in fact, the Government is at present appealing to all gas undertakings to mobilize their resources in the production of home-produced fuel, and I have no doubt that the Industry will respond as it did in the last war.
>
> The motor industry makes use of it.
>
> Its products are being used by local authorities, and could be extended in this direction.

In these and other ways the Industry performs a vital service without Government assistance or encouragement in the form of subsidy or in the removal of obsolete and cumbersome enactments. I think, however, there are signs on the horizon that the Industry will come into its own in the not distant future. When that time comes we must be ready and show that the Industry possesses highly-trained men, both technically and commercially, who can run it efficiently, with advantage to itself and to the great public it serves. This is essentially going to be the work of the younger men and it is comforting to know that they realize this and are preparing themselves for that day by membership of the various Junior Associations.

Beyond saying that there are difficult times ahead for the Industry, I purposely refrain from touching on the problems which will arise as a result of the war, as this matter is being dealt with by Mr. Madden.

In conclusion, I devoutly hope that by the time the next President addresses you this ghastly war, with all its attendant miseries, will be but a memory.

Vote of Thanks

The President was accorded a very hearty vote of thanks on the proposition of Mr. H. D. Madden, who said it was only by research that they would derive the fullest possible benefit from their commodities. For example, in the future tar products were going to be something very much greater than they knew them to-day. The same thing applied to coke, for which there existed an enormous field, especially in connexion with domestic uses. As an Industry, it should be remembered that they were providing sulphate of ammonia for the "grow more food" campaign.

CARBONIZATION OF STOCK COAL

By J. C. HOGG, Stretford

From a Paper to the Manchester and District Junior Gas Association, April 27.

The loss in value by deterioration of coal stocks can be considerable and sufficient to affect seriously the practical and economical aspects of carbonization.

Until recently our prepared stocking accommodation was limited to 14,000 tons capacity, but, as it has been considered necessary to aim at a stock of 10 weeks' winter demand, provision is being made to increase this quantity.

The coal stocks are fairly equally divided into four sections, our policy being to replace one section every four years. This at first sight may seem frequent, but results have shown that the practice is not uneconomical.

Methods of Stocking

On both works coal is stocked in the open, where the advantage of free air circulation is obtained. Local overheating has seldom been observed, but provision is made for the early detection of any such trouble. By the insertion of steel tubes at frequent intervals along the stock heaps the temperatures at various depths of the stock can be readily taken. The stocks are retained by low walls, which also serve to deflect the wind from the bases where overheating, on the windward side, is most likely to occur.

On No. 1 Works the stock heaps are adjacent to the railway sidings. Above the centre of each stock runs a mono-rail telpher track, a 2-ton grab being used for handling the coal at a rate of 30 tons per hour. Coal may be handled either direct from the canal barges or from the wagon tippler pit.

On No. 2 Works stocking is carried out by means of a central rubber belt conveyor and throw-off carriage on each side, the maximum rate of handling being 60 tons per hour.

In reclaiming the stocks on No. 1 Works the grab can deal unaided with the bulk of the coal. The remainder is brought to the grab by small mechanical shovels. Two of these shovels are also used on No. 2 Works for reclaiming the stock. In this case they carry and deposit their loads either direct to the rotary wagon tippler pit or into wagons for re-tipping.

Working on coal, these shovels handle on an average 20 tons per hour each with a petrol consumption of 0.78 gal. per hour.

The additional expense of carbonizing through stock is:

No. 1. Works.	Pence/ton.	No. 2 Works.	Pence/ton.
Stocking and reclaiming	12.933	Stocking and reclaiming	11,929
Direct handling ...	6.613	Direct handling ...	4,620
Difference	6.320	Difference ...	7.309

Mean additional cost 6.814*d. per ton.*

The recent conditions regarding coal supplies necessitated the extensive use of our coal stocks. Although on occasions stock coal was carbonized unmixed with other coal, it can be definitely stated that neither with the two-year or four-year old stocks was any change in carbonizing results detected, with the exception of a slight increase in breeze formation, which rose from 14% to 18% of the coke produced. The proximate analyses of the stocks resorted to are:

Stock.	Moisture.	O.V.M.	Ash.	F.C.	Swelling No.
No. 1 ...	3.1	36.5	3.3	57.1%	5½
No. 2 ...	2.4	35.4	3.7	58.5%	5
No. 3 ...	3.5	34.9	3.7	57.9%	7

Under normal conditions with the policy described above the replacement of a stock is fairly gradual, the stock coal being carbonized together with the regular supplies. It may be said, therefore, that no deleterious results need be expected from the adoption of this system of stocking. Consideration of the quantity of stock to be changed in relation to the total coal carbonized and the cost involved serves to place the method in its right perspective.

Cost of coal carbonized per annum (approximate), £130,000.

Weight of coal in stock (based on 10 weeks' winter load) ... 25,000 tons.

Stock replacement per annum ... ... $\frac{25,000}{4}$ = 6,250 tons.

Addition cost involved at 6.81d. per ton = £177 per annum or 0.13% of coal costs.

If deterioration through prolonged stocking is permitted the loss in value can easily exceed this figure. In this respect the view held at Stretford is that the coal to and from the stock heaps is worthy of the same careful attention as is given to gas making and ancillary plants.

The enormous satisfaction of knowing that an emergency of any kind can be met without upsetting the normal carbonizing schedule is well worth an additional cost of, say, £200 per annum.

American Investigation

In the course of the discussion Mr. **D. Benson** (Bolton) said that when carbonizing coal from stock in continuous vertical retorts, the throughput immediately altered owing to loss of pasticity and softening of the coal. The gas produced was of a lower calorific value, under set conditions, while the actual reduction in output was approximately 10%. There was also a bigger proportion of breeze and the coke produced was definitely softer.

Mr. **J. Albinson** (Manchester) was of the opinion that the broad facts of the matter were that coal lost its caking property and gas making yields on storage, and by far the most important of these was the loss of caking power.

American investigators, he continued, have found that the characteristic rate of oxidation increases with increasing volatile content, a coal of 38% volatile matter oxidizing three times as fast as a coal of 18%. The rate of oxidation decreases rapidly as the coal consumes oxygen, the rate of oxidation being inversely proportioned to the fourth root of the amount of oxygen consumed.

The rate is also proportional to the oxygen concentration, being equal to the 0.61th power of the oxygen concentration in the gaseous phase. The rate of oxidation increases 1.7 times for each 10° C. rise in temperature.

The rate of oxidation is proportional to surface area, and oxidation ultimately leads to complete destruction of caking property.

The American work was continued to investigate the changes in carbonizing properties on oxidation. The main conclusions were :

(1) Coking property gradually reduced to zero as oxidation proceeds. A mildly oxidizing strong caking coal gave a denser coke, but in all cases the friability of the coke was increased.
(2) Tar yields were uniformly decreased by 16% on the average.
(3) Liquor yields increased.
(4) In all cases lower calorific value of gas was obtained. With high caking coals, an actual increase of therms was observed on mild oxidation—*i.e.*, the volume of the gas was increased.

The sensitivity of coals to oxidation, as measured by a 20% reduction of caking power was determined. Generally, the higher caking coals were more sensitive. Against this, however, must be allowed the lower rate of oxidation, and the increased reserve of caking power of these coals.

The first desirable feature, said Mr. Albinson, was to exclude air to the utmost possible degree. The ideal would be a hermetically sealed box under vacuum. With this ideal in mind, each works should choose the site and arrangements best suited to its own local conditions. At Partington Works, stock coal had not lost its caking power in ten years. The store was a completely enclosed concrete structure overlaid by rail sidings, and not ventilated in any way. The coal stocked was approximately 50:50 Lancashire and Yorkshire.

Coals of the lowest volatile matter and high caking power had the lowest rates of oxidation, and at least some proportion of these should be stocked in graded sizes of a 2-3 in. nut, preferably washed. The graded coal had been broken already along the lines of greatest weakness, and being washed its pyrites content would be low. It would pack evenly, and, in all probability, it would be easier to handle. Such a coal would have a considerable reserve of caking power, and in a good coal store should stock for a period up to 20 years without total loss of caking power. At Partington Works it means a washed Yorkshire coal, as reserves of such coal in Lancashire were very limited.

The practice of drawing coal for use from stock and continually replacing had many drawbacks. These were, chiefly, the cost of handling and breakage, together with the very much increased danger from firing, as all the coal was oxidizing at its most rapid rate when freshly won.

He considered that the correct policy was a well designed stores, combined with stocking of the finest class of caking washed nuts available.

GASHOLDER HEATING IN QUEBEC* By C. W. Delorey,

Plant Engineer, Gas and Coke Division
Quebec Power Company

PROVISION must be made for the heating of water sealed gasholders in localities where the temperature drops to 32° F. and lower. In Quebec holder heating is necessary for five months of each year.

This Paper covers our method of holder heating with the costs involved. It also makes some slight comment on holder tank insulation, tank insulation cost, and such insulation value to the operator.

The holders to be heated are of the guide frame type with steel tank completely above ground. A few details concerning these holders are given in the following table:

	Main Storage Holder.	Relief Holder.
Capacity	1,000,000 cu. ft.	100,000 cu. ft.
Number of lifts	3	2
Diameter of tank	130 ft. 6 in.	62 ft. 6 in.
Height of tank	30 ft.	14 ft.
Area of cylindrical surface of tank	12,293 sq. ft.	2,747 sq. ft.
Area of water surface in tanks and cups exposed to air	877 sq. ft.	239 sq. ft.
Volume of water in tank	2,466,000 galls.	258,400 galls.
Volume of water in cups	8,000 galls.	290 galls.
Distance of holder from boiler room	772 ft.	520 ft.

The holders are heated by means of steam which is fed directly to the water in the cups and holder tank. Fig. 1 shows the

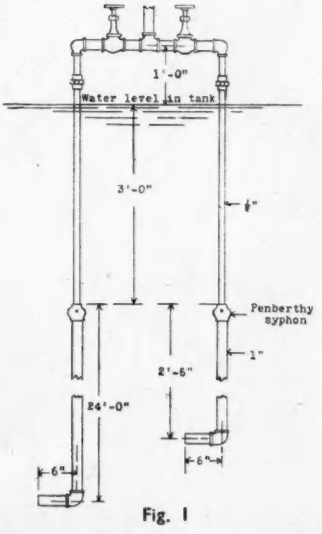


Fig. 1

arrangement of piping for introducing steam into the tank of the 1,000,000 cu.ft. holder. Two Penberthy ½ in. steam syphons are connected as shown. Both syphons are placed 3 ft. below the level of the water in the tank. One syphon delivers its heated water at a depth of 5 ft. 6 in., while the water from the other syphon is discharged at a point 3 ft. from the bottom of the tank. In each case, the water is released in a horizontal direction in order to create circulation of the water in the tank. Four sets of two syphons are used. These are placed on the north, south, east, and west side of the holder. Since the circumference of the holder is 410 ft., there is, therefore, a distance of 102 ft. 6 in. between each set of syphons.

The water in the cups is heated by the use of Penberthy ¼ in. steam syphons installed as shown in Fig. 2. Four of these are

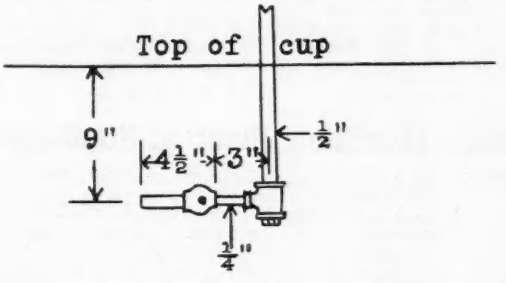


Fig. 2

used in the top cup. It was found that two steam syphons are sufficient to maintain the necessary water temperature in the lower cup because this cup is frequently submerged in the tank water.

The 100,000 cu.ft. relief holder is equipped with a 1 in. steam main supplying five ⅛ in. Penberthy steam syphons. These are placed at a depth of 3 ft. below water level and the hot water is discharged at a depth of 10 ft. No provision is made for heating the water in the cup as the cup is left submerged in the tank water during critical weather. All steam mains on the holders are insulated with 1 in. magnesia pipe insulation, canvas covered.

Irrespective of what method is used to heat holders it is obvious that costs can be kept down by a systematic and careful control of the temperature of holder water. If this matter is left to the discretion of plant labour there is a tendency to err on the side of high temperature rather than court the danger of ice formation. A recording thermometer—the chart of which is changed daily—is used to follow the temperature of the water in the main storage holder. The bulb of this thermometer is located on the west side of the holder at a depth of 7 ft. and at a distance of 25 ft. from the nearest steam syphon. In exceptional cold weather a check is made to determine what variation if any exists in the temperature of the holder water at different depths and at positions farthest away from the syphons. No more than a 2° F. difference has ever been found with that of the reading given by the recording thermometer. The temperature of the water in the cups is checked by the watchman who visits the holder every two hours. He also notes the reading of the recording thermometer and makes such adjustments in the steam flow as are thought necessary.

* A Paper to the Canadian Gas Association.

The temperature of the holder water usually varies between 44° F. and 50° F., with an average of 48° F. At these temperatures we are definitely certain that there is no chance of anchor ice formation, and there is sufficient heat stored in the water to prevent freezing in the event of a short interruption in the steam supply to the holder. The water temperature in the cups varies from 32° F., with slight ice formation to 80° and 90° F. There is no recording thermometer to register the temperature here. Temperature variations are much greater than in the tank because of the comparatively small volume of water to be heated. Every effort is made, however, to keep cup temperature below 60° F.

The average weekly outside temperatures together with the average weekly holder tank temperature are plotted in Fig. 3.

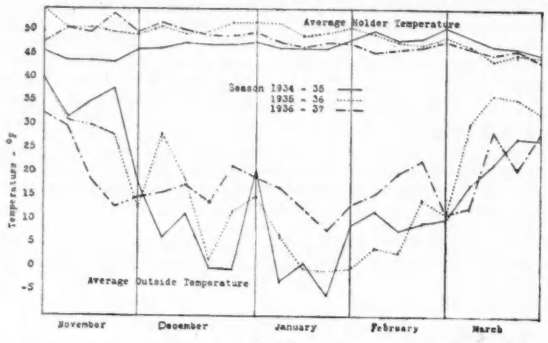


Fig. 3

The holder temperatures given are those of the tank water in our main storage holder. The average weekly outside temperatures as given are obtained from daily average temperatures recorded at the gas-works. These check with those obtained from the local observatory. The average holder water temperature for the heating season 1934-35 was 47.1° F.; in 1935-36 it was 49.7° F.; and in 1936-37 it was 48.4° F. The average outside temperature for the five month period 1934-35 was 16° F.; in 1935-36 it was 18.2° F.; and in 1936-37 it was 18.8° F. The average degree day difference between holder water temperature and outside temperature during the heating season, 1934-35 was 31.1° F.; in 1935-36 it was 31.5° F.; and in 1936-37 it was 29.6° F. The lowest weekly outside temperature recorded was during the fourth week of February, 1935, with an average of minus 5.6° F. for the week. It will be noted that during the three heating seasons under review average weekly temperatures have been zero or below on seven different occasions.

In the table which follows the fuel and B.Th.U. required for the heating of our 1,000,000 cu.ft. main storage holder are given. In practice the 100,000 cu.ft. relief holder is heated simultaneously with the main storage holder and there is no provision made for measuring the heat requirements of each separately. To simplify comparisons it is felt desirable to confine our observations to the main storage holder. It is assumed that the steam used by the relief holder is directly proportional to its tank radiation area and water temperature, and, on this assumption, it is calculated that one-quarter of the total steam requirements for holder heating is used by the relief holder.

TABLE SHOWING HEAT REQUIREMENTS FOR 1,000,000 CU. FT. GAS STORAGE HOLDER.

	1934-35.	1935-36.	1936-37.
Period of heating season ...	22 weeks	22 weeks	22 weeks
Total degree hours temp. difference between holder water and outside temp.	115,008	116,448	109,512
Fuel used—Tar	68,500 galls.	63,700 galls.	59,800 galls.
B.Th.U. of fuel per gallon ...	170,000	170,000	170,000
B.Th.U. of steam input to holder	5,822,500,000	5,414,500,000	5,083,000,000
Total B.Th.U. input to holder per degree hour temp. difference per sq. ft. of cylindrical surface of tank	4.13	3.78	3.77

Authorities agree that the heat loss from the tank wall with a wind velocity of 10 miles per hour is approximately 2.2 B.Th.U. per sq.ft. per hour per °F. temperature difference of water to air. We have found that the total heat loss expressed in terms of tank radiation area averages for the three seasons under review 3.89 B.Th.U. It can, therefore, be concluded that 1.69 B.Th.U. or approximately 42% of the total heat required for the holder is used to care for heat losses from the bell top, the lifts, the cups and from the bottom of the holder to ground. Insulation of the tank wall, therefore, can effect a reduction in only 58% of the fuel bill.

The heat losses in B.Th.U. per sq.ft. per hour per °F. temperature difference water to air from the tank sides when lagged with magnesia is as follows:

3 in. Magnesia	0.15
2 in. Magnesia	0.20
1½ in. Magnesia	0.26
1 in. Magnesia	0.40

The cost of insulating the tank with 1 in. magnesia, which incidentally shows the greatest return per dollar invested, is approximately $6,000.00. Interest, depreciation, and repairs should involve an amount of about $800.00 per year. An annual saving of 47.5% of the fuel used, or 30,000 gallons of tar could be expected from this investment. The saving, therefore, appears to be of sufficient importance to justify the expenditure. We hesitate in the investment, however, in that the item of repair cost or maintenance of such an insulation job has never been made sufficiently definite to us. The annual repair bill might easily grow to an amount which would make the investment an unprofitable one.

The possibility of insulating the tank by the erection of a wooden fencing around the tank has also been considered. Although we know that this has been done elsewhere with satisfactory results, the plan has been eliminated from consideration because of the fire hazard involved.

Coke Handling Plant at Southgate

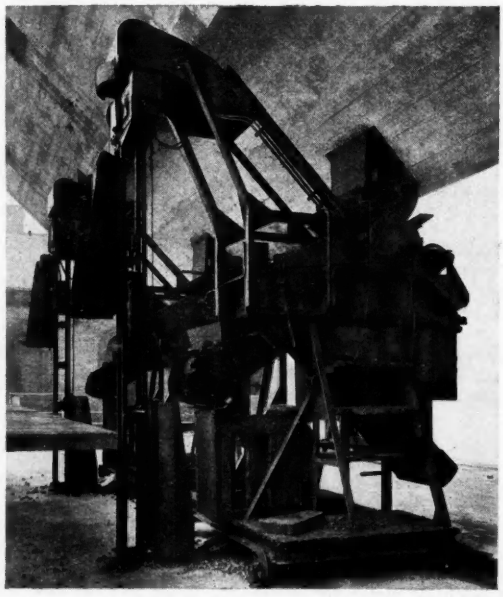
COKE storage bunkers are being constructed with considerably increased headroom under the outlets so as to facilitate the inclusion of mechanical equipment for the final distribution of the material. This equipment usually consists of a battery of debreezing machines arranged either for bagging or bulk loading and, in certain cases, both. When dealing with bagging the ideal layout provides for a two-stage platform beneath the debreezer, the upper stage for accommodating the weighing machine and the lower for facilitating the operations of the stacker. Such a layout may necessitate the hopper outlet being 16 to 18 ft. above nominal ground level.

Many storage bunkers exist, however, which may be considered to be excellent buildings in every way with the exception that the headroom beneath the outlet is low. In such cases, many owners have provided additional outlets in the side of the hoppers in order that a proper bagging and loading platform, together with an efficient screen, may be employed. This, however, is not always possible due to site or constructional difficulties.

The Tottenham and District Gas Company, having at its Southgate works a coke storage bunker of the low type, tackled the problem in an original manner by installing three special machines, each capable of traversing, debreezing, weighing, bagging, and sack hoisting, the machines being designed and manufactured by A.C.E. Machinery, Ltd., of Brentford.

In the initial stages, it was found that a standard A.C.E. 2-ft. traversing, debreezing, and weighing unit could be accommodated on the existing track beneath the bunkers; the only difficulty lay in raising the loaded sacks from ground level on to the back of the stacker waiting at tail board level, and in doing so quickly. A vertical steel tower was placed in front of the "Belle Isle" weighing machine and was arranged to swivel through an arc of 180°. The tower was supported at the head and base by means of a jib-structure and footpin, both incorporated on the debreezing machine.

An A.C.E. traction sheave type winch, having totally enclosed oil-immersed gears and an electro-mechanical brake was built into the head of the rails for operating the twin sack hoisting platforms, placed on opposite sides of the rails, the height of the lift being 6 ft. 9 in. The reeving of the hoisting bond was such as to provide a two-fall system, the platforms being counter-



balanced and arranged so that when one was at ground level the other was fully elevated. The output capacity was found to be 200 sacks (10 tons) per hour of clean coke, accurately weighed

in 1-cwt. sacks and stacked on to the lorry. A hoisting speed of 100 ft. per minute was provided, and the platforms were automatically brought to rest by means of limit switches suitably placed on the rails. Incorporated in the head of the rails was a built-in limit switch for preventing the sack platforms from being operated in a fouling position.

Three men—an operator, a sacker, and a stacker—are normally employed. The operator's function is to control the A.C.E. debreezing machine and the "Belle Isle" weigher. The sacker places the empty sack in position on the hoisting platform and rotates the tower through 90° when the sack has been charged from the weigher. The operator presses the push button controlling the hoisting winch which elevates the sack to full height. The stacker rotates the tower through a further 90° and takes the sack on to his back, thus at the same time placing the other platform in position beneath the weigher. In the interval taken for the sack to be hoisted and rotated at the top, the debreezing machine has charged the "Belle Isle" weigher and the sacker has prepared his next sack for charging.

FOUNDATIONS

By J. HARGREAVES,

of the Bradford Gas Department

In a Paper to the Yorkshire Junior Gas Association on April 20, Mr. J. Hargreaves (Bradford) discussed the problem of foundations. On the question of concrete mixing he emphasized that only a sufficient quantity of water should be added to give a "workable" mix. The time taken for mixing, he observed, should be uniform, as this has a bearing upon the strength of the concrete. A convenient and effective time is to mix dry for half-a-minute and wet for one-and-a-half minutes. The addition of excessive water should be avoided always.

While, he continued, it is a general practice to leave a foundation ½ in. low for the purpose of grouting, it is a frequent request of most erectors to "leave the foundation low enough." They would rather use extra packings than chip off portions of concrete. In the case of foundations required for flat bottomed objects such as tanks, steel condensers, &c., a good plan is to leave the foundation 1½ in. down and erect the tank or whatever it is on long packings. Then, instead of running liquid grout under, make a stiff mixture of sand and cement and force this in from all directions and point neatly round the edges. If notice is ever taken of the underside of a tank which has been grouted with liquid grout, it will be found that only a portion of the base has been actually touching the foundation.

When a box has been filled for, say, an engine bed, the top should not be finished off smooth with steel float. It may look better, but in the process a surplus of sand is brought to the surface and so forms a skin or layer of soft concrete. This is a disadvantage when driving in wedges to level up the machine.

For any kind of concrete work, good tackle is essential. Wheelbarrows should be of steel and not wood. Handcarts should have steel or steel iron linings. Square-mouthed shovels should be provided.

Old, used timber may be all right for rough mass concrete, especially for foundations below ground. If, however, a good shape is required, it pays to use new or unwarped boards. The most convenient sizes are 9 in. × 2 in. and 7 in. × 2 in. While timber is a very expensive item, a lot of expense can be incurred in straightening and making old warped boards fit a required shape. If a foundation is required to have a smooth finish, such as the portion of an engine bed which is above the engine room floor line, planed boards should be used. An engine room is usually warm, consequently the surface of the concrete hardens quickly and is very difficult to rub down, in fact if it is allowed to set completely, nothing short of an emery block will touch it.

A newly made concrete floor is often found to be dusty when swept. A method of remedying this, which has been tried with success, is as follows: Into 4 gallons of water mix 1 gallon of a 1 in 5 solution of silicate of soda. Apply to concrete with watering can and brush. Repeat this when concrete is dry until no more solution is absorbed. Leave for 24 hours and brush off any surplus solution.

The quantities given are generally sufficient for the treatment of 35 square yards.

For Purifiers

Mr. Hargreaves went on to describe work carried out at Bradford. Among the items to which he referred was foundation work for purifiers. The main portion of the job consisted of a reinforced concrete slab to accommodate four purifier boxes 40 ft. by 30 ft. and four 30 ft. by 30 ft. The overall size of the slab was 125 ft. by 80 ft., varying in thickness from 8 in. to 1 ft. 1 in., and was laid on what for 60 years had been a revivifying floor. Although no general excavations were required, it was necessary to dig holes for the eight seal pots, which were 5 ft. deep. These were in two lines. The holes were at 30 ft. centres. The first excavation revealed soft yellow clay; in the second soft black coal was found; in the third soft grey shale, while in the fourth very hard sandstone was encountered. These different materials were found immediately beneath the existing concrete floor.

It will be seen from these results, said Mr. Hargreaves, how necessary it is for trial holes of some kind to be made if an accurate estimate is to be obtained regarding the cost of a foundation. For example, if an engine bed had been required on this site, a depth of 4 ft. or 5 ft. would have been necessary in the first position, while 2 ft. or 3 ft. would have been sufficient in position four.

The time allowed for this job was fourteen days, and as it involved the placing of 450 tons of reinforced flooring, time was a very important factor.

The first layer of 1½ in. to 2 in. was laid over the area to be occupied by the first four boxes. Screeding boards 1½ in. thick were then placed so as to form bays about 10 ft. wide. These were fixed so as to hold down the expanded metal reinforcement.

The specification called for a variation in the finished level of not more than plus or minus ¼ in., and as this was to be obtained without a fine finishing layer, considerable care had to be taken in setting the screeding boards level. When these were finally levelled, alternate bays were concreted, and finished off with a steel shod screeding board.

When the purifier boxes were erected, they were required to be grouted underneath. Grouting holes fitted with screwed plugs had been provided in several of the bottom plates. A cement fillet was run round the base of the side plates, leaving plenty of sight holes, which were made up with cement when grout appeared. The grout was introduced in the following manner. A cylinder was constructed by welding a piece of ¼ in. plate to each end of a 3 ft. piece of 12 in. steel pipe. Three unions with cocks were welded to the cylinder. To one of these was attached a flexible tube, the other end of which was connected to a small air compressor. To the second, which was on top of the cylinder, was fixed a funnel through which was poured the cement grout. To the third was fixed one end of a long rubber hose, the other end being fitted with a screwed piece of wrought iron pipe to insert into the grout holes in the base plates. When the cylinder was filled with grout, the funnel cock was closed and the compressor started up. When the pressure reached 5 lb. per sq.in., the outlet cock was opened. As the cement grout appeared at the various holes the screwed plugs were inserted. This method ensured the complete filling up of the space between the foundation and the underside of the bottom plates.

The Steam-Carbon Complex

In a communication to the Chemical Society, S. Muller and J. W. Cobb describe experiments made on the interaction of steam and carbon to determine whether the formation and persistence of a complex could be demonstrated.

The work described is not a general investigation of the interaction of carbon and steam, but a specific experimental enquiry into the fixation of steam by carbon at pressures near atmospheric, which it seems to establish. It is probable that a similar fixation of steam and hydrogen would occur at high pressures, but that the mode of decomposition would be different. The work carried out by F. J. Dent and others is of interest in this connexion, state the Authors, particularly with reference to the production of methane, which may have important industrial applications.

"Our results and their indications," they state, "may be summarized as follows:

"(1) The action of steam at 300° on charcoal in a closed space resulted in the fixation of steam. No permanent gas was evacuated at 300° after attainment of equilibrium, but, on heating and evacuating in stages up to 1,050°, the solid residue underwent such change that gas was withdrawn from it consisting of hydrogen and of oxides of carbon in which the combined oxygen was equivalent to the hydrogen. The volume of steam represented by this decomposition was the same as the 'missing volume' represented by the fall of pressure which occurred at 300° during the exposure of the steam to the carbon. With higher initial temperatures of interaction, the results were similar, but some permanent gas was withdrawn on evacuation without further heating.

"(2) The gas evacuated at 1,050°, representing the final stage of decomposition, was of the 'ideal water-gas' composition, 50% H_2, 50% CO. During (approximately) the first half of the temperature rise from 300° to 1,050° the gas evacuated contained combined oxygen in the oxides of carbon more than equivalent to the hydrogen, then came a stage in which this was balanced by an excess of hydrogen over combined oxygen, with a final stage of equivalence and the ideal water-gas composition.

"(3) The departure from equivalence of hydrogen and combined oxygen in all but the later stages of decomposition can be understood in the light of results obtained by parallel experiments made with hydrogen, instead of steam, in which the fixation of hydrogen, as relevant to this enquiry, was studied and demonstrated, so that its liberation into the free space at the time of its formation by decomposition of the carbon-fixed steam was not to be expected.

"(4) The results obtained indicate the initial formation of a carbon-steam complex, $C_x(H_2O)_y$, in which $y=1$ at the higher temperatures, in accordance with the decomposition $C_x(H_2O) \rightarrow CO+H_2+C_{x-1}$, complete at 1,050°, and y is slightly greater than unity at the lower temperatures, allowing the formation of carbon dioxide in the first decomposition products. The gas evacuated at the temperature of interaction contained most of the carbon dioxide.

"(5) From a few preliminary tests it would appear that the results depend on the form of carbon used—*e.g.*, a high-temperature coke from a fusible caking coal, prepared at 1,000° and heated under vacuum at 1,100°, gave no evidence of the steam fixation at 300° which occurred with wood charcoal, but a specially prepared medium-temperature (800°) coke behaved like charcoal in forming a complex at 550° with steam, which yielded hydrogen and oxides of carbon on thermal decomposition."

Supply of Gas and Air to Furnaces

A PATENT just granted to the Dudley, Brierley Hill, and District Gas Company, and A. H. White (No. 520,334; application date, Oct. 5, 1938) is concerned with the proportioned flow of gas and air to furnace burners. It relates to a proportional device for the regulation of relative flow; and the advantage claimed is separate delivery of gas and air subsequent to proportioning. The proportioning valve can be made to supply a number of burners which may or may not be independently controlled, and can be arranged where convenient irrespective of its distance from the burners. The accompanying drawing shows a sectional view of the gas and air proportioning device.

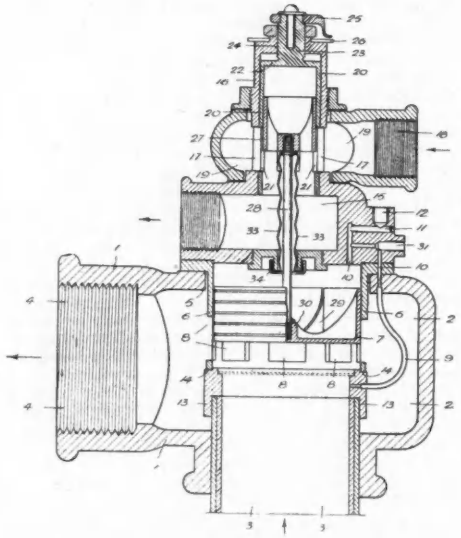
A valve casing 1 is formed with a large chamber 2 at its lower end into which an air inlet pipe 3 is led and from which, preferably at right angles to the inlet, an outlet pipe 4 is arranged.

In the upper wall of this air chamber is an aperture 5 corresponding approximately in size with the air inlet, and in this aperture a machined sleeve 6 is provided to form a cylinder in which a piston member 7 may work. The wall of this cylinder at the lower part is provided with a number of openings 8 forming outlets to the chamber, and thence to the air outlet. The movement of the piston in the cylinder is adapted to vary the size of these openings and so regulate the area of the communication between the air inlet and the air outlet.

From the air inlet, below the piston, a by-pass pipe 9 and a passage 10 lead to the part of the chamber above the piston, and in this passage a release 11 to atmosphere is provided having a control cock 12.

Above the chamber 2 is an outlet chamber 15 for the gas, which is sealed from communication with the lower air chamber.

Co-axial with the air-controlled piston is a cylindrical extension 16 of the upper wall of this gas outlet chamber 15 with apertures 17 through the cylindrical wall in line with a gas inlet 18 leading in at right angles to the axis of the cylindrical extensions 16. Around these openings, and corresponding to the position of the gas inlet, an annular chamber 19 is formed. By means of this chamber, communication between the gas inlet and the gas outlet



through the openings in the wall of the cylindrical extension is provided. Working within the extension a ported sleeve 20 is arranged, which is adapted for rotation so that its ports 21 can be set to register more or less with the openings in the extension.

Means for rotating this ported sleeve are provided which will allow it to be set in an adjusted position so that a definite degree of opening may be obtained. One means for the purpose is to make the sleeve with a blind end 22 at its upper part short of the end wall or top of the cylindrical extension, and to provide it with an externally screwed spigot part 23 working through a screw threaded aperture 24 in the end wall. The spigot may be operated by a lever arm 25 which can work over a scale 26 to provide an indication of the ratio or proportion of the gas to air required to be maintained for the operation of the burner throughout its range from small supply to full supply.

For the automatic proportioning of the air and gas, there is provided within the cylindrical extension 16 a piston or a sleeve valve 27 which is directly connected by a rod 28 with the floating piston that controls the air outlet passages in the air control chambers. To prevent the escape of gas along the rod into the air chamber flexible bellows 33 secured by the bush 34 are provided.

The air control piston is formed as a hollow bucket member with stiffening radial ribs 29 leading from its surrounding wall to the central boss 30, in which the connecting rod is screwed. The piston then forms a receptacle for oil, and a wick feed may be carried from the interior of the piston through the wall to the wall of the body of the chamber, or the sleeve which forms the cylinder in which the piston moves.

After the ratio-setting sleeve 22 on the gas inlet has been set to give the proportion of gas opening to air opening required to be maintained the release control 12 is opened so as to exhaust the air in the by-pass and on top of the piston. This causes the full air pressure to be applied to the underside of the piston 7 while there is only atmospheric pressure on its upper side, so that it rises to open the air and gas valves to the maximum. In this condition the air supply can leak to atmosphere through the by-pass and the release. To limit this leakage to the minimum required for satisfactory control an adjustable bleed 31 is provided in the by-pass 10. The position of the piston 7 for equilibrium depends on the pressure above the piston, and this can be controlled by the amount of opening of the release 12 to be any amount from atmospheric pressure (in which case the valves are opened fully) to the air supply pressure (in which case the valves would close).

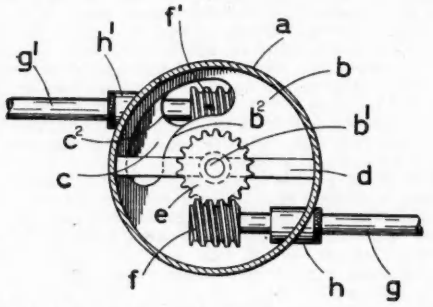
In cases where the air and gas pipes to the burners are provided with control cocks the ratio setting sleeve 20 may be omitted. The ratio then being chosen by the setting of the control cocks and the amount controlled as before by the setting of the release 12 in the proportioning device.

"Compensation" for Unpaid-for Gas

THE object of a patent granted to George Wilson Gas Meters, Ltd., J. H. Wilson, and C. E. Poole (No. 520,300; application date, Nov. 4, 1938) is to provide in prepayment meters a means whereby compensation for unpaid gas may be obtained.

According to the invention, the members of the gas inlet valve comprise two ported super-imposed discs each provided with a port, the arrangement being such that after the prepaid quantity of gas has been consumed the valve will remain nominally closed for the greater part of a complete revolution of that member of the valve which is rotated by the meter mechanism.

Figure 1 is a cross-sectional view of the gas inlet pipe showing



the valve and its operating mechanism.

Referring to the drawing, *a* represents a portion of the gas supply pipe leading to the meter, and *b*, *c* the two relatively rotatable ported members constituting the valve. These two members are arranged in close contact with each other and with the bore of the pipe *a* and are each supported by a bar *d*. The two members *b* and *c* are rotated relatively to one another by the prepayment mechanism and by the meter mechanism respectively and for this purpose the spindle of each member has a gear wheel fixed thereto, one *e* of which is driven by a worm *f* carried by a spindle *g* in operative connexion with the prepayment mechanism, while the other wheel is driven by a worm f^1 carried by a spindle in operative connexion with the meter mechanism. Each spindle is supported in a gas-tight bush, *h*, h^1 let into the wall of the pipe *a*. The ports b^2, c^2 in the two members may be of the same, or, as shown, of different sizes.

The arrangement and operation of the two members of the valve is such that when a coin is inserted in the prepayment mechanism, the operation of the latter causes, say, the ported member *b* to be rotated into a position in which, as represented in the diagram, the port b^2 is in register with the port c^2 in the member *c*. The member *b* is now held stationary by the prepayment mechanism and as the prepaid quantity of gas passes through the meter the member *c* is rotated relatively to the member *b*. When the prepaid quantity of gas has been used the relative angular positions of the two members is such that their respective ports b^2, c^2 are out of register with one another and the gas supply is nominally cut off.

If, however, there is a leakage of gas to the meter after the valve is nominally closed the meter mechanism will continue to rotate the ported member *c* relatively to the first ported member *b* now held stationary, thus relieving the meter mechanism of any undue stresses. This increased movement of the ported member *c* is a measure of the amount of unpaid gas which has passed through the meter. If now another coin is inserted in the prepayment mechanism the resulting rotation of the ported member *b* may only be just sufficient to bring the port b^2 into register with the port c^2 in the other member, or partly into register therewith, in which case the amount of gas obtainable will be the full prepaid amount

less the amount of unpaid gas which has previously passed through the meter.

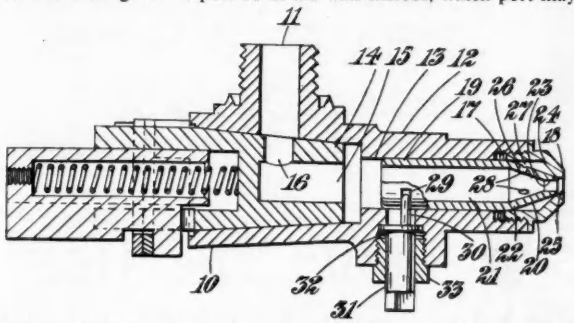
It may be, however, that the amount of unpaid gas which has passed through the meter between two consecutive coin insertions exceeds the amount prepaid by the second coin, in which case it will be necessary to insert a further coin to bring the port b^2 into register with the port c^2.

In every case the operation of the valve is such that full compensation is obtained for any unpaid gas passing through the meter.

Injectors for Gas Burners

A RECENT patent granted to R. and A. Main, Ltd., and R. Taylor (No. 518,832; application date, Sept. 5, 1938) is for improvements in an injector for a gas burner. The following is a description of one form of gas injector, reference being made to the accompanying drawing, which shows a longitudinal section through the injector.

The injector is shown formed at the end of a gas cock casing 10 having a gas supply passage 11. The injector comprises a hollow injector body 12 having a cylindrical bore 13 which communicates at one end with the interior of the cock casing. Mounted within the cock casing is a tapered valve plug 14 having a bore 15 communicating with a port 16 in the wall thereof, which port may



be brought into and out of register with the gas supply passage 11. By these means, the supply of gas to the injector may be controlled. The end of the bore in the injector body remote from the gas cock is internally threaded at 17 to receive a threaded part of an injector nozzle 18.

Axially slidable within the injector body is a hollow cylindrical stem 19 which is open at one end and thus may communicate with the gas supply passage 11 and is provided with a tapered extremity 20 at the other end, having an angle of taper of about 40°. The bore of the stem conforms to the external shape—*i.e.*, it is provided with a cylindrical part 21 and a taper part 22 which opens into a cylindrical passage 23. The injector nozzle is also provided with an internal tapering surface 24 which terminates at one end with a cylindrical outlet opening 25 and at the other end with a cylindrical wall 26 which forms a continuation of the bore of the injector body. The angle of taper of the tapering surface 24 is greater than that of the tapered end 20, whereby an annular outlet passage 27 is provided between the injector nozzle and the tapered end. For example, the larger angle of taper may be 90°. The diameter of the outlet opening 25 may be equal to or slightly less than the diameter of the smallest part of the tapered end 20. One or more openings 28 are formed in the wall of the tapered end of the stem. The end of the stem adjacent the gas cock is provided with a short circumferential slot 29 which is engaged by an eccentric pin 30 formed at the end of a rotatable plug 31 mounted in the side wall of the injector body. The plug may be arranged to extend through a gland 32 controlled by a gland nut 33. Rotation of the plug 31 results in axial adjustment of the stem 19, whereby the tapered end may be moved towards or away from the outlet opening 25.

A National Savings Week

The National Savings Committee is organizing a National Savings Week from June 9 to 15. The object is not so much to raise a large sum of new money during the week, but to increase the number of savings groups. Of these there are already over 80,000. By June 15 it is hoped to achieve at least 100,000. Closely allied to this main object is the desire to increase the membership of existing groups and to increase the amounts of the weekly subscriptions to them paid by members.

Of the savings groups formed since last November 75% are in places of employment. The action of the Government in exempting from various means tests £375 worth of new savings has drawn from the Trade Union Congress a declaration and a broadcast urging all trade unionists to support the voluntary savings movement. Organized employers have given assurances that proof of the workers' capacity to save shall not prejudice future wage negotiations. It is hoped that these assurances will result in a strong stimulation of savings groups in all industries and trades.

Employers who have not yet formed groups or given facilities for their formation should place themselves in touch with the National Savings Committee, Sanctuary Buildings, 20, Great Smith Street, Westminster, S.W.1.

Gas Undertakings' Results

Imperial Continental Gas Association

In their report for the 116th year of the Imperial Continental Gas Association's commercial activity (covering the twelve months to March 31), the Directors state that increases in profits before the outbreak of war and decreases thereafter were common to both the Belgian and French Companies in which the Association is interested. For the year, the combined profits of the Belgian Companies were approximately maintained. In view, however, of the unsettled outlook, several Companies declared reduced dividends, in order to strengthen their reserves. In France, the net result for the Compagnie Continentale du Gaz was a decrease in profits of 7½%. This Company was particularly affected by the outbreak of war, on account of the partial evacuation of Lille and Nancy, which are its most important areas of supply. Gross income from investments in Great Britain, consisting principally of the holding in Edmundsons Electricity Corporation, Ltd., showed an increase of £6,138 over the previous year. A dividend for the year of 6% will leave a balance of £226,419 to be carried forward. The balance at credit of Profit and Loss Account for the year was £213,064.

Peterborough

An increase for the year ended March 30 in gas sales of just over 3% was reported at the annual meeting of the Peterborough Gas Company. The dividend declared at the rate of 7½% on the consolidated ordinary stock leaves a balance of £13,987 at credit of Profit and Loss Account. The installation of new carbonizing plant which it is hoped will be in operation next September has during the past year involved an expenditure of £9,675 out of revenue, resulting in a reduction of the gross profit to £11,948.

South Midland Corporation

The profit for the year ended March 31 of the South Midland Gas Corporation, Ltd., is £6,157, and the dividend for the twelve months of 5½% on the ordinary shares will leave to be carried forward £887, as against the £812 brought into account. Several sums have been applied to writing-down or to reserve in connexion with various items. For the year to March, 1939, the profit was almost exactly the same, at £6,150, and the dividend also was the same.

Trade News

"K.B." Heaters and Coolers

A new "KB" flueless gas-fired unit heater has been designed by Keith Blackman, Ltd., Mill Mead Road, Tottenham, N.17, for warming factories, workshops, and similar premises. The source of heat is a battery of screen protected luminous flame burners, in which combustion is complete and odourless. All that is necessary to provide the heating is a supply of gas at town's pressure, and electrical energy to drive a fan motor. A special design of fan is mounted below the main body of the unit, and this discharges the warm air downwards in the form of a rotary cone. There is also a small supplementary air inlet to the fan which permits, in suitable situations, the introduction into the building of a certain amount of outside air if desired. This feature is an advantage when units are used in the summer, without heat, as air circulators, to improve ventilating conditions. The burners consume one therm of gas per hour and give 90,000 B.Th.U. output; the fan circulates 81,000 cu.ft. of air per hour with a consumption of electrical energy of approximately 150 watts. When the supplementary air inlet is in use, about 7,000 cu.ft. of the total volume of 81,000 cu.ft. of air per hour is fresh and not re-circulated air.

Keith Blackman, Ltd., are also supplying large numbers of a new type of fan unit for cooling. The unit is designed for blowing cool air at workers engaged in hot spaces at furnace fronts in gas-works, engineering shops, &c. The complete unit is of heavy all-steel construction, and consists of a special motor-driven propeller fan, of 12 to 42 in. diameter, mounted on a steel supporting column fitted to a heavy steel base. Arrangements are made for adjusting the direction of air flow as desired, and a fabricated sheet steel housing encloses the fan blades to assist air direction, the housing being fitted with galvanized wire guards, back and front. These fan units are effective up to about 60 ft., and maintain an air velocity varying from about 2,000 ft. per minute at the fan down to about 100 ft. at the extreme end of the air stream. The larger units, with fan blades, from 24 to 42 in. in diameter, can, if required, be provided with universal castors under the base.

Gauge Movements

British-made gauge movements for vacuum, pressure, oil, and steam are the subject of a new folder issued by Rotherham & Sons, Ltd., of Coventry, who are making gauge movements in large quantities and carry a representative stock of standard sizes. The wide range of movements illustrated includes a model especially designed for temperature indicators and similar instruments, with a gear ratio of 11 to 1.

From the Daily Sketch 13/5/40

Gas-Pokers

Sir,—To assist the general public to save paper, could the gas company be urged to start a special drive to show people the advantages of gas-pokers for fire-lighting?

Britain consumes vast quantities of paper every year—3,250,000 tons in 1938 alone. Housewives use a great part of that in lighting fires and boilers.

A third of this huge total comes from abroad and, with imports from Scandinavia restricted, will be impossible to obtain. Here is an opportunity for a sensible economy—using gas—which is a home-produced product, and of which there is no scarcity—in place of paper and wood, which are scarce and more urgently needed for other purposes.

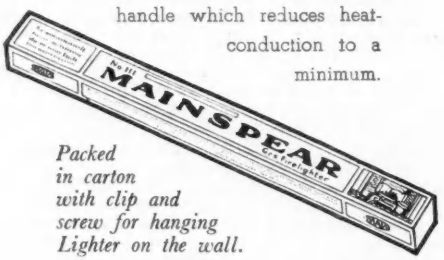
(Mrs.) [illegible]

West [illegible]

Show your Consumers the way to Save Paper and Wood by the use of the

MAIN

The MAINSPEAR has a cast-iron head finished in best black, and a plated tube with a plated coiled handle which reduces heat-conduction to a minimum.



Packed in carton with clip and screw for hanging Lighter on the wall.

No. 111

MAINSPEAR

Firelighter

Manufactured by
R. & A. MAIN LIMITED
LONDON AND FALKIRK

GAS STOCKS AND SHARES

The Stock Exchange put up a fine resistance to the critical events of last week, and in this it was aided by the Emergency Powers (Defence) Act. During the week prices fluctuated as the various items of news came through and the volume of business was small throughout. On Wednesday gilt-edged stocks were practically down to their minima, but the new Act speedily led to a recovery and British Funds closed higher than a week ago—2½% Consols finished at 74, against 71½. The home rail market was difficult and some heavy falls occurred, while there was little business done in industrials, although the reaction in prices was not excessive. The more speculative sections followed the general trend and prices closed at lower levels.

As will be seen in the table below, the Gas Market suffered with the rest and, with the falling off in the volume of business, prices failed to respond to the recovery in the gilt-edged section. Gas Light units fell a further 1s. and are now on offer at 15s. to yield 6% on last year's rate of dividend. Many of the other leading ordinaries also reacted a point or two. Prices on the Provincial Exchanges, however, were held with the exception of Bristol, which fell 3 points to 103, and Newcastle units with a drop of 4½d. to 18s. 9d. Nominal quotations in the Supplementary Prices remained unchanged.

At times like these only forced sales are coming into the market, so that apart from a few parcels of leading ordinaries there is little stock on offer. Especially is this the case with preference and debenture issues, although among the latter a parcel of £905 Commercial 3% debenture at 67 yielding £4 9s. 6d.% and £364 5% debenture at 104 yielding £4 16s. 2d.% may be of interest.

The Directors of the Associated Gas and Water Undertakings propose to distribute a final ordinary dividend of 2½% again, making 5% for the year. The net revenue for the year to March 31 last was £74,574 (against £75,150 for 1938-39), and the carry-forward will be £32,551, compared with £22,760 brought in.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 24.	Rise or Fall on Week.
1,767,439	Mch. 11	8	7	Alliance & Dublin Ord. ...	112—117	...
374,000	Dec. 27	4	4	Do. 4 p.c. Deb. ...	80—90	...
957,608	May 13	5	5	Asscd. Gas & Water U'd'ts Ord.	14/—16/-	...
500,000	"	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	15/6—17/6	-/6
535,545	"	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6	...
336,646	"	4	4	Do. 4 p.c. Irred. Cum. Pref.	13/—15/-	...
750,000	Mch. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	82—87	...
560,070	Feb. 19	7	7	Barnet Ord. 7 p.c.	122—127	...
300,000	Apl. 8	1/4⅜	1/9⅜	Bombay, Ltd.	19/6—21/6	...
181,915	Feb. 26	9½	9½	Bournemouth Sliding Scale ...	145—150	...
690,526	"	7	7	Do. 7 p.c. max. ...	123—128	...
493,960	"	6	6	Do. 6 p.c. Pref. ...	116—121	...
50,000	Dec. 18	3	3	Do. 3 p.c. Deb. ...	70—75	...
362,025	"	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	"	5	5	Do. 5 p.c. Deb. ...	105—110	...
357,900	Feb. 19	7½	6½	Brighton, &c., 6 p.c. Con. ...	103—108	...
659,955	"	6½	5⅞	Do. 5 p.c. Con. ...	100—105	...
205,500	"	6	6	Do. 6 p.c. 'B' Pref. ...	103—108	...
855,000	Mch. 11	7	8	British Ord.	90—100	...
100,000	Dec. 18	7	7	Do. 7 p.c. Pref.	120—125	...
350,000	"	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	"	4	4	Do. 4 p.c. Red. Deb.	77—82	...
450,000	"	5	5	Do. 5 p.c. Red. Deb.	100—105	...
100,000	22 May '33	6	4	Cape Town, Ltd.	¼—¾	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref.	¼—¾	...
150,000	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	53—58	...
626,860	Jan. 29	6	5⅞	Cardiff Con. Ord.	103—108	...
237,860	Dec. 18	5	5	Do. 5 p.c. Red. Deb. ...	95—100	...
98,936	Apl. 8	2/-	2/-	Colombo Ord.	1½—1½	...
24,510	"	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	20/—22/-	...
739,453	Mch. 26	-/11.48	-/11.48	Colonial Gas Assn. Ltd. Ord. ...	14/6—16/6	...
296,144	"	1/3.30	1/3.30	Do. 8 p.c. Pref.	20/—22/-	...
1,775,005	Jan. 29	4	2	Commercial Ord.	45—50	...
140,000	Feb. 19	4	4	Do. 4 p.c. Red. Pref. ...	87—92	...
620,000	Dec. 11	3	3	Do. 3 p.c. Deb.	62—67	...
286,344	Feb. 19	5	5	Do. 5 p.c. Deb.	97—102	...
200,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb.	93—98	...
807,560	Feb. 12	7	7	Croydon sliding scale ...	97—102	-3
644,590	"	5	5	Do. max. div. ...	85—90	-2
620,385	Dec. 7	5	5	Do. 5 p.c. Deb.	102—107	-1
208,660	Feb. 19	5	5	Dudley, Brierley Hill & Dist. Ord.	98—103	...
82,275	"	5	5	Do. 5 p.c. Con. Pref. ...	93—98	...
79,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	93—98	...
239,000	Jan. 29	5	88/6	East Hull Ord. 5 p.c.	70—80	...
187,215	Feb. 12	5⅜	5⅜	East Surrey Ord. 5 p.c. ...	93—98	...
176,211	Dec. 18	5	5	Do. 5 p.c. Deb. ...	100—105	...
250,000	Nov. 13	8	4	Gas Consolidation Ord. 'B' ...	15/—17/-	...
250,000	May 13	4	4	Do. 4 p.c. Red. Cum. Pref.	15/—17/-	...
19,152,410	Jan. 29	5⅜	3⅜	Gas Light & Coke Ord. ...	13/—15/-a	-1/-
2,600,000	"	3½	3½	Do. 3½ p.c. max.	62—67	..
4,477,106	"	4	4	Do. 4 p.c. Con. Pref. ...	85—90	...
2,993,000	Jan. 2	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	87—92	-1
8,602,497	Nov. 27	3	3	Do. 3 p.c. Con. Deb. ...	71—76	-1
3,642,770	"	5	5	Do. 5 p.c. Red. Deb. ...	103—108	-2
3,500,000	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	100—105	-2
700,000	Mch. 11	3½	3½	Do. 3½ p.c. Red. Ded. ...	87—92	...
270,466	Feb. 19	6	6	Harrogate New Cons.	93—98	...
157,500	Apl. 8	‡1/-	‡1/-	Hong Kong and China Ord. ...	⅛—¾	...
5,600,000	May 13	4	8	Imperial Continental Cap. ...	47—57	-3
172,810	Jan. 29	3½	3½	Do. 3½ p.c. Red. Deb. ...	80—85	...
63,480	Dec. 18	3	3	Maidstone 3 p.c. Deb.	55—60	...
45,000		†10	†8	Malta & Mediterranean ...	92—102	...
				Metropolitan (of Melbourne) ...		
392,000	Apl. 1	5½	5½	5½ p.c. Red. Deb.	95—100	...
231,977	Feb. 19	5	5	M.S. Utility 'C' Cons.	78—83	...
968,658	"	4	4	Do. 4 p.c. Cons. Pref. ...	83—88	-2
390,076	Dec. 18	4	4	Do. 4 p.c. Deb. ...	87—92	...
148,955	Dec. 18	5	5	M.S. Utility 5 p.c. Deb. ...	103—108	...
125,000	Jan. 2	3½	3½	Do. 3½ p.c. Red. Bds. ...	90—95	...
675,000	May 6	†4	†4	Montevideo, Ltd.	58—63	...
250,000	Mch. 18	7½	5 7/10	North Middlesex 6 p.c. Con. ...	103—108	...
396,160	Jan. 29	5	5	Northampton 5 p.c. max. ...	97—102	...
300,000	Apl. 29	9	7	Oriental, Ltd.	113—118	...
468,537	Dec. 11	8	7	Plymouth & Stonehouse 5 p.c.	118—123	...
621,667	Feb. 5	8⅛	8⅛	Portsmouth & Gosport Cons.	110—115	...
241,446	"	5	5	Do. 5 p.c. max.	85—90	...
73,350	"	5	5	Do. 5 p.c. Pref.	90—95	...
75,000	"	4	4	Do. 4 p.c. Pref.	75—80	...
114,000	Feb. 5	5	5	Preston 5 p.c. Pref.	88—93	...
247,966	Dec. 18	4	4	Primitiva 4 p.c. Cons. Deb. ...	93—98	...
625,959	Jan. 15	4	4	Do. 4 p.c. Red. Deb. ...	91—96	...
15,000	Mch. 11	6	6	San Paulo 6 p.c. Cum. Pref. ...	7⅛—8⅛	...
441,275	Apl. 29	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	16/6—18/6	...
460,810	Mch. 11	-/10⅜	-/10⅜	" " 4½ p.c. Cum. Pref. ...	16/6—18/6	...
133,201	Feb. 12	8½	5	Shrewsbury 5 p.c. Ord. ...	105—115	...
9,000	June 5	†4	†4	South African Ord.	4—5	...
1,996,297	Apl. 29	1/2⅜	1/-	South East'n Gas Cn. Ld. Ord.	13/—15/-	-1/-
1,000,000	Mch. 4	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	16/6—18/6	...
769,191	"	4	4	Do. 4 p.c. Cum. Pref. ...	15/—17/-	...
450,000	Feb. 12	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
150,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
6,709,895	"	5	4	South Met. Ord.	61—66	-2
1,135,812	"	6	6	Do. 6 p.c. Irred. Pref. ...	110—115	...
850,000	"	4	4	Do. 4 p.c. Irred. Pref. ...	83—88	-1
1,895,445	Dec. 27	3	3	Do. 3 p.c. Deb.	72—77	...
1,000,000	Jan. 15	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
600,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	92—97	...
1,543,795	Feb. 5	6	3	South Suburban Ord. 5 p.c. ...	77—82	...
512,925	"	5	5	Do. 5 p.c. Pref.	93—98	...
500,000	"	4	4	Do. 4 p.c. Pref.	82—87	...
250,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	90—95	...
888,587	Dec. 11	5	5	Do. 5 p.c. Deb.	104—109	-1
250,000	"	4	4	Do. 4 p.c. Deb.	87—92	...
200,000	Feb. 12	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...
427,859	Apl. 15	-/9⅜	1/2½	S. Western Gas & Water Ord.	13/—15/-	...
160,523	"	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	16/6—18/6	...
110,000	Dec. 18	4	4	Do. 4 p.c. Red. Deb. ...	90—95	...
750,541	Feb. 5	5	5½	Southampton Ord. 5 p.c. ...	75—80	-2
148,836	Dec. 27	4	4	Do. 4 p.c. Deb.	87—92	...
350,000	Feb. 12	5½	5½	Swansea 5½ p.c. Red. Pref. ...	97—102	...
200,000	Dec. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—100	...
1,076,490	Feb. 26	6½	5	Tottenham and District Ord....	93—98	-1
409,835	"	5½	5½	Do. 5½ p.c. Pref.	102—107	-1
62,235	"	5	5	Do. 5 p.c. Pref.	95—100	...
453,380	Dec. 11	4	4	Do. 4 p.c. Deb.	87—92	...
1,247,505	May 20	4	6	U. Kingdom Gas Cor. Ord. ...	13/6—15/6*	-/-6
1,085,952	May 13	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	14/6—16/6	...
772,709	"	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	14/—16/-	...
745,263	Dec. 18	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	13/—15/-	-/6
1,093,656	Mch. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	83—88	...
378,106	Mch. 11	7	7	Uxbridge, &c., 5 p.c.	95—100	...
133,010	"	5	5	Do. 5 p.c. Pref. ...	95—100	...
1,371,138	Feb. 5	6½	3½	Wandsworth Consolidated ...	83—88	-2
2,525,768	"	4	4	Do. 4 p.c. Pref.	82—87	-2
1,343,964	Dec. 18	5	5	Do. 5 p.c. Deb.	106—111	...
383,745	"	4	4	Do. 4 p.c. Deb.	87—92	...
400,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	90—95	...
558,342	Jan. 29	6½	6	Watford and St. Albans Ord. ...	95—100	...
200,000	"	5	5	Do. 5 p.c. Pref.	95—100	...
200,000	"	5½	5½	Do. 5½ p.c. Pref.	100—105	...
200,000	"	4	4	Do. 4 p.c. Rd. Pf. (1973/8)	85—90	...
100,000	"	33/4⅜	4	Do. 4 p.c. Red. Pf. (1959)	93—98	...
200,000	Dec. 11	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Contd.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations May 24.	Rise or Fall on Week.
202,152	Mch. 18	5	5	Ascot Ord.	80—85	...
128,182	Dec. 27	5	5	Do. 5 p.c. Pref. ...	88—93	...
31,035	Mch. 4	-/9⅝	-/9⅝	Associated Utilities 4 p.c. Pref.	15/—17/-	...
100,000	Dec. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
17,000	Feb. 19	8	8	Bognor Orig. Ord. 'A' ...	102—112	...
62,210	,,	8	8	Do. New Add. 'A' ...	102—112	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	95—105	...
37,440	Jan. 29	10	10	Cam. Univ. & Town 10 p.c. max.	145—155	...
125,970	,,	7	7	Do. 7 p.c. max.	110—120	...
39,025	,,	5	5	Do. 5 p.c. max.	80—90	...
96,410	Jan. 29	4½	4½	Cardiff 4½ p.c. Pref.	90—95	...
55,520	Feb. 19	6	6	Colchester 6 p.c. Pref.	100—105	...
90,550	Mch. 18	5	5	Do. 5 p.c. Deb. ...	98—103	...
150,000	Feb. 12	4	4	Croydon 4 p.c. Pref.	82—87	...
130,000	Dec. 27	4	4	Do. 4 p.c. Deb.	87—92	...
65,000	Mch. 4	7½	6⅞	Eastbourne 'A' 5 p.c.	105—110	...
198,000	,,	6	5⅝	Do. 'B' 3½ p.c. ...	93—98	...
112,312	,,	5	5	Do. 5 p.c. Pref.	90—95	...
130,000	Dec. 18	5	5	Do. 5 p.c. Deb.	98—103	...
130,500	Feb. 19	7½	7½	Exeter New Ord. (£10) ...	12—14	...
24,000	Aug. 21	8½	8½	Gt. Yarmouth 8½ p.c. max. (£30)	15—20	...
59,400	,,	7½	7½	Do. 7½ p.c. max. (£30) ...	10—15	...
51,160	Dec. 11	5½	5½	Do. 5½ p.c. Deb.	102—107	...
152,600	Feb. 26	8	9	Guildford Cons.	110—120	...
54,055	,,	5	5	Do. 5 p.c. Pref.	90—95	...
68,250	Dec. 11	5	5	Do. 5 p.c. Deb.	90—95	...
156,600	Feb. 19	7	5	Hampton Court Cons. ...	75—85	...
86,046	June 19	14½	15	Holyh'd&N.W.G.&W.Cpn.Ord.	13/6—15/6	...
80,000	Feb. 12	4	4	Lea Bridge 4 p.c. Pref.	75—80	...
60,000	,,	6	6	Do. 6 p.c. Pref.	105—115	...
94,876	Dec. 18	4	4	Do. 4 p.c. Deb.	88—93	...
73,620	Mch. 18	8½	8½	Luton Cons. 'A'	115—125	...
107,960	Feb. 26	4	5½	Mid Kent Ord. (£10)	7½—8½	...
230,940	Feb. 5	10	10	Oxford & District Ord. ...	135—145	...
47,112	,,	5	5	Do. 5 p.c. Pref.	85—90	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	100—105	...
126,193	May 13	7½	7½	Peterborough Ord.	138—148	...
64,990	Mch. 18	7	7	Redditch Ord.	100—110	...
166,850	Feb. 19	8	8	Romford Ord.	108—118	...
60,000	,,	4	4	Do. 4 p.c. Pref.	85—90	...
44,000	Mch. 18	5	5	Do. 5 p.c. Deb.	97—102	...
25,570	Feb. 12	5½	5½	Rugby 5½ p.c. Pref.	100—110	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	100—105	...
42,750	Dec. 11	5½	5½	Do. 5½ p.c. Deb.	105—110	...
110,950	Feb. 26	8	8	Ryde Ord.	100—110	...
270,086	Mch. 18	7	7	Slough Ord.	98—103	...
21,000	Dec. 11	5	5	Do. 5 p.c. Deb.	98—103	...
28,872	May 13	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	14/—16/-	...
28,866	Mch. 18	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	14/—16/-	...
127,228	Feb. 19	5	7	Swindon Cons.	75—80	...
60,425	Dec. 18	5	5	Do. 5 p.c. Deb.	95—100	...
64,380	,,	5	5	Torquay & Paignton 5 p.c. Pref.	85—90	...
130,000	Feb. 12	5	5	Wakefield Ord.	85—95	...
81,650	,,	5	5	Do. 5 p.c. max.	75—80	...
82,000	Jan. 29	6	6	Weymouth Ord.	82—87	...
273,626	Feb. 12	7	7	Wolverhampton Cons. Ord. ...	115—120	...
98,384	,,	6	6	Do. 6 p.c. Pref.	105—115	...
160,000	Dec. 18	5½	5½	Do. 5½ p.c. Red. Deb. ...	100—105	...
106,490	Mch. 18	5½	5½	Wrexham Ord	75—85	...
90,000	Dec. 18	5	5	York 5 p.c. Red. Deb.	95—100	...
133,640	Feb. 19	6	6	Yorktown (Cam.) 5 p.c. Cons.	82—87	...
120,000	,,	5	5	Do. 5 p.c. Pref.	85—90	...
35,000	Dec. 18	5½	5½	Do. 5½ p.c. Deb.	105—110	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 24.	Rise or Fall on Week.
347,756	Feb. 1	5	6	Bath Cons.	105—107	...
1,667,250	Feb.	5	5	Bristol, 5 p.c. max.	102—104	-3
120,420	Dec.	4	4	Do. 1st 4 p.c. Deb.	98—101	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	115—117	...
274,000	Feb. 26	5	5	Newport (Mon.) Ord.... ...	91—94	...
13,200	Mch. 26	7	8⅝	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½	...
13,600	,,	5	6	Do. 7 p.c. 'B'	10—11	...
40,000	,,	5	6	Do. 7 p.c. 'C'	10—11	...
140,778	Feb. 12	5	5	Weston-super-Mare Cons.	92—96	...
64,338	Dec. 27	4	4	Do. 4 p.c. Deb.	90—95	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	140—150	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 24.	Rise or Fall on Week.
157,150	Feb. 5	5	6½	Chester 5 p.c. Ord.	98—101	...
92,500	Dec. 18	4	4	Do. 4 p.c. Pref.	84—88	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	85—88	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—99	...
2,167,410	Feb. 19	6	6	Liverpool 5 p.c. Ord.	109—111	...
245,500	Dec. 18	5	5	Do. 5 p.c. Red Pref. ...	99½—102½	...
306,083	July 17	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	Feb. 5	10	8	Preston 'A' 10 p.c.	160—170	...
188,219	,,	7	7	Do. 'B' 7 p.c.	115—125	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 24.	Rise or Fall on Week.
122,577	Feb. 19	7	7	Blyth 5 p.c. Ord.	113—118	...
732,000	Feb. 19	4	4	Hartlepool G. & W. Cn. & New	65—67	...
2,430,267	Feb. 5	5	5 7/10	Newcastle & Gateshead Con.	18/6—19/-o	-/4½
682,856	,,	4	4	Do. 4 p.c. Pref.	90—92	-1
776,706	Dec. 27	3½	3½	Do. 3½ p.c. Deb.	84—86	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	100—102	...
332,351	Feb. 5	6	6	Sunderland 6 p.c. max. ...	111—113	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 24.	Rise or Fall on Week.
542,270	Feb. 12	6	9	Derby Con.	103—108	...
55,000	Dec. 18	4	4	Do. 4 p.c. Deb.	98—103	...
20,000	Dec. 18	5	5	Long Eaton 5 p.c. Pref.	9—11	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	100—105	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 24.	Rise or Fall on Week.
10,000	Feb. 19	10	10	Great Grimsby 'A' Ord. ...	170—180	...
6,500	,,	10	10	Do. 'B' Ord. ...	170—180	...
79,000	,,	10	10	Do. 'C' Ord. ...	160—170	...
1,806,339	Feb. 26	6½	6½	Sheffield Cons.	125—127	...
95,000	Jan. 2	4	4	Do. 4 p.c. Deb.	98—100	...

o The quotation is per £1 of Stock.
* Ex. div. ‡ For year.

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